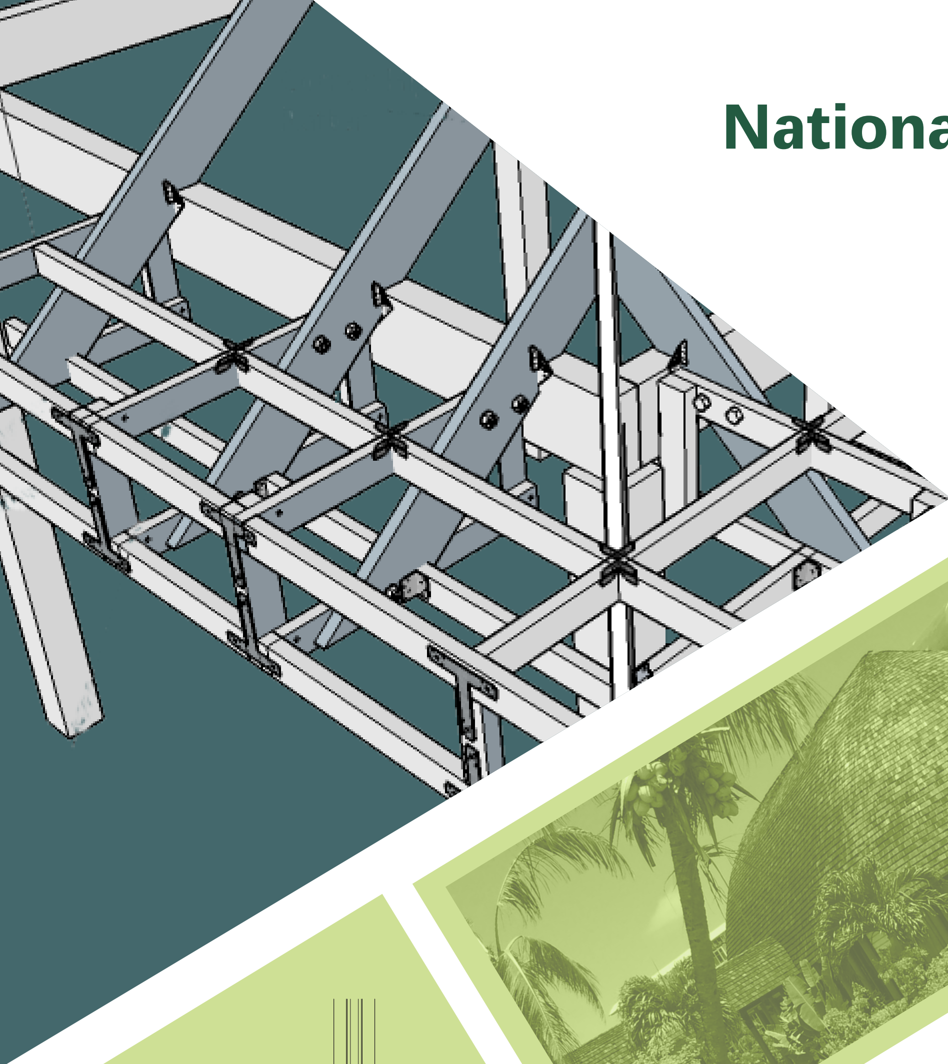
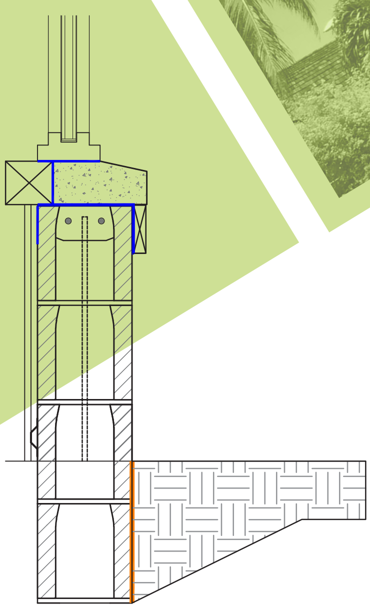
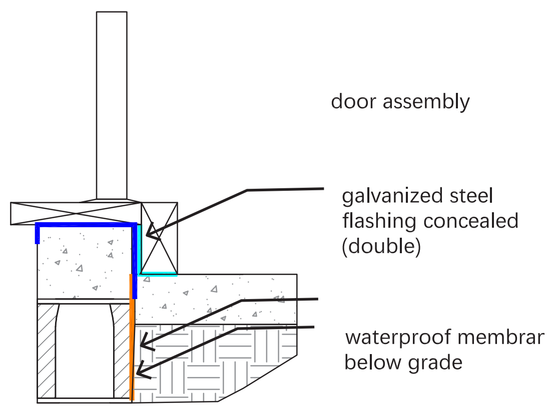
February 1, 2017

National Building Code of Samoa







NBC

Acknowledgments

A number of people and organisations have contributed to the successful completion of the National Building Code 2017 update (NBC). The NBC could not have been completed without their cooperation, insight, and experience. We acknowledge with gratitude the dedication and effort of the following contributers, who under the wisdom and guidance of our Almighty God, dedicated their time, energy and knowledge throughout the process:

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Ministry of Works, Transport and Infrastructure (MWTI)

February 1, 2017

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Introduction

About the NBC

The National Building Code of Samoa (NBC) is a performance based set of standards that provides objectives and descriptions of how a building and site should be constructed to achieve a structurally-sound and sustainable built environment. As a performance based document, the NBC describes the outcome of a DEVELOPMENT project rather than prescribing a step-by-step method of how to construct.

The basic objective of the NBC is to ensure that acceptable standards of structural sufficiency, fire safety, health, amenity and response to the impacts of climate change are provided so that buildings, facilities and sites are constructed, maintained and demolished in a safe and environmentally responsible manner.

The provisions in the NBC are intended to extend no further than is necessary to safeguard the health and safety of people and the environment. They are intended to be cost effective, not needlessly onerous in their application, to promote design innovation, and be easily understood.

Update from the 1992 Building Code

The NBC is an update from the previous Building Code that was enacted by the Government of Samoa in 1992 and replaces it in its entirety. The basic structure of the 1992 Building Code was used for the NBC, but many new sections are added to respond to current environmental issues facing Samoa today. Where still valid, wording from the 1992 Building Code has been retained, but much of it is updated to respond to current construction standards.

What is in the NBC?

The NBC provides a list of standards to be used for the construction, maintenance and demolition of buildings, site servicing and amenities on site.

When reading the NBC, all blue-coloured words represent different BUILDING FUNCTIONS as defined in Section A1, while all capitalised words are included in the definitions in Section A3.

Section A is different from the rest in that it provides definitions and other classifications that apply to all other sections in the document.

Sections B through K list provisions that must be satisfied in order for a BUILDING PERMIT to be granted and/or for a DEVELOPMENT project to be endorsed by the Government of Samoa. Each Section has a list of objectives followed by a list of PERFORMANCE REQUIREMENTS describing the outcome that must be achieved. A list of DEEMED-TO-SATISFY PROVISIONS are associated with all PERFORMANCE REQUIREMENTS that describe methods, outcomes, materials and measurements that if followed will be deemed to satisfy some or all of the PERFORMANCE REQUIREMENTS. Finally, a list of acceptable solutions by approved agencies such as from the Standards Association of Australia and New Zealand, are provided that, if followed, will satisfy the PERFORMANCE REQUIREMENTS.

It must be recognised that a building code cannot cover every issue concerned with the design and construction of buildings. In the case of innovative, complex or unusually HAZARDOUS building proposals, or other building work beyond the scope of the NBC , legislation may provide for other suitable action.

Layout of the NBC

The NBC begins with Section A - General Provisions that apply in all situations including definitions and building classifications. It is then divided into nine sections:

Section B - Stability
Section C - Fire Protection
Section D - Access
Section E - Hazardous Substances
Section F - Interior
Section G - Site Servicing and Waste
Section H - Climate Change Adaptation
Section J - Natural Disaster Resilience
Section K - Accessory Structures

Enabling Legislation

The NBC is brought into effect by The Ministry of Works Act 2002 (as amended), which empowers the Ministry of Works, Transportation and Infrastructure to regulate certain aspects of the building process including the creation and administration of the National Building Code, which has now been renamed as the National Building Code.

The legislation also outlines procedures, among other things, for amendments to the NBC, compliance, offences and liability, inspections, suspension or revocation of a BUILDING PERMIT, and requirements to comply.

Authority of the NBC

According to the Ministry of Works Act, 2002, as amended, provisions in the NBC apply to all proposed DEVELOPMENT projects that are under consideration for a BUILDING PERMIT from the date that the NBC is enacted. Requirements in the NBC will extend throughout the LIFESPAN of the project, for SPECIFIED SYSTEMS, maintenance, alteration and demolition.

The NBC may be used as a guideline or reference document by other government ministries and agencies for Government of Samoa approvals such as a Development Consent application (required by PUMA), but the provisions in the NBC are only enforceable for the BUILDING PERMIT approval process, maintenance, alterations and demolition via the Ministry of Works Act, 2002, as amended. **The ability of a proposed DEVELOPMENT to meet the requirements in the NBC does not override any decision on Development Consent or other approvals of the Government of Samoa.**

Building Regulations

The Ministry of Works Act 2002 (as amended) provides for the creation and administration of BUILDING REGULATIONS which are administered by the Ministry of Works, Transportation and Infrastructure (MWTI).

They set out procedures for the BUILDING PERMIT approval process, including:

- submission and approval procedures
- issue of BUILDING PERMITS
- inspections during and after construction
- provision of evidentiary certificates
- issue of certificates of occupancy or compliance
- accreditation or approval of materials or components
- review and enforcement of standards
- fees and charges

The Submission Requirements listed at the end of each subsection in Sections B to K provide a general description of the information required to satisfy that particular section of the NBC, and should not be thought of as a complete list of requirements.

Mandatory Provisions in the NBC

The following provisions of the NBC are mandatory:

(a) Section A: General Provisions

(b) Objectives listed at the beginning of each section

(c) PERFORMANCE REQUIREMENTS listed at the beginning of each subsection in Sections B to K

Deemed to Satisfy Provisions

For every section in the NBC, a list of Deemed to Satisfy Provisions follows the PERFORMANCE REQUIREMENTS. The DEEMED-TO-SATISFY PROVISIONS list techniques and standards that, if followed, will satisfy one, some or all of the PERFORMANCE REQUIREMENTS for the subsection. The applicant must list the DEEMED-TO-SATISFY PROVISIONS that apply, and demonstrate how they are fulfilled to demonstrate compliance with the PERFORMANCE REQUIREMENTS.

Acceptable Solutions, Standards and other References

For every subsection, the Deemed to Satisfy Provisions are followed by a list of Acceptable Solutions that, if followed, are sufficient to satisfy the PERFORMANCE REQUIREMENTS of the NBC. The ACCEPTABLE SOLUTIONS and/or the DEEMED-TO-SATISFY PROVISIONS may be used by the applicant to demonstrate compliance with the PERFORMANCE REQUIREMENTS and the Objectives.

The Acceptable Solutions contain standards approved by REGISTERED TESTING AUTHORITIES, Approval Boards and Regulatory Agencies acceptable to Government of Samoa.

All references to an Acceptable Solution, Standard, plan or document refers to the latest edition or issue, together with any amendment and only so much as is relevant in the context in which the document is quoted.

In some cases, Acceptable Solutions, standards and references developed in other countries have provisions that are more appropriate for the foreign context. To ensure that Acceptable Solutions, rules, specifications and provisions from other countries are not in conflict with the standards in Samoa, the following exclusions apply to documents / standards written in foreign countries:

(a) the respective rights, responsibilities or obligations between the foreign body and any manufacturer, supplier or purchaser are not applicable

(b) the responsibilities of any tradesman or other building operative, architect, engineer, authority, or other person or body to the foreign country will not be required

(c) required submission for approval of any material building component, form or method of construction, to any person, authority or other body will not be enforced unless specifically requested in the NBC

(d) submittal of a material, building component, form or method of construction for review by the Standards Association of Australia, Standards Association of New Zealand or other body in a foreign country is not applicable

(e) permitting a departure from the Acceptable Solution rule, specification or provision at the sole discretion of the manufacturer or purchaser, or by arrangement or agreement between the manufacturer and purchaser is not permitted, unless approved by the Government of Samoa as part of the BUILDING PERMIT approval process

Objectives, Performance Standards and Deemed-To-Satisfy Provisions in the NBC take precedence regarding any difference between it and any Acceptable Solution, rule, specification or provision listed in this document.

Further, references in the NBC to any Standard or Code of Practice issued by the Standards Association of Australia or New Zealand, or such other body, exclude the need for:

(a) compliance with NZS 1900 wherever it is quoted in any standard

(b) compliance with any laws and legislation that are not Samoan

Alternations to Non-Conforming Existing Buildings

Buildings, Facilities, Siteworks, Site Servicing and Sites that exist prior to the enactment of the NBC that do not comply with the provisions in the NBC are not required to comply with the NBC. However, if an application is made to alter, renovate, add-on, change or demolish the structure or site

in any way, the proposed changes will be subject to all applicable Sections in the NBC. Additional works outside of the proposed scope of work may also be required if deemed necessary to bring the proposed DEVELOPMENT to an acceptable health and safety standard, as determined by the Government of Samoa.

Alternative Solutions

The Deemed-To-Satisfy ProvisionS and Acceptable Solutions listed in the NBC illustrate means of satisfying the PERFORMANCE REQUIREMENTS, but PERFORMANCE REQUIREMENTS can also be met by an Alternative Solution. When an Alternative Solution is used, it must satisfy the objectives and performance that would have been achieved had the Deemed-To-Satisfy ProvisionS and Acceptable Solutions been followed.

Administrative Discretion

As a performance-based code, the NBC will be subject to discretionary decision-making from time to time in terms of determining if a particular material or construction method is "suitable" and appropriate for achieving the PERFORMANCE REQUIREMENTS.

The APPROVAL AUTHORITY responsible for the enforcement of the NBC retains the right to determine "suitability" where the NBC provides the opportunity for interpretation. A means for appeal of any discretionary decisions is provided for in the Building Regulations.

Measurement of Distances

Where the NBC has provisions for minimum or maximum distance between objects, the following criteria apply:

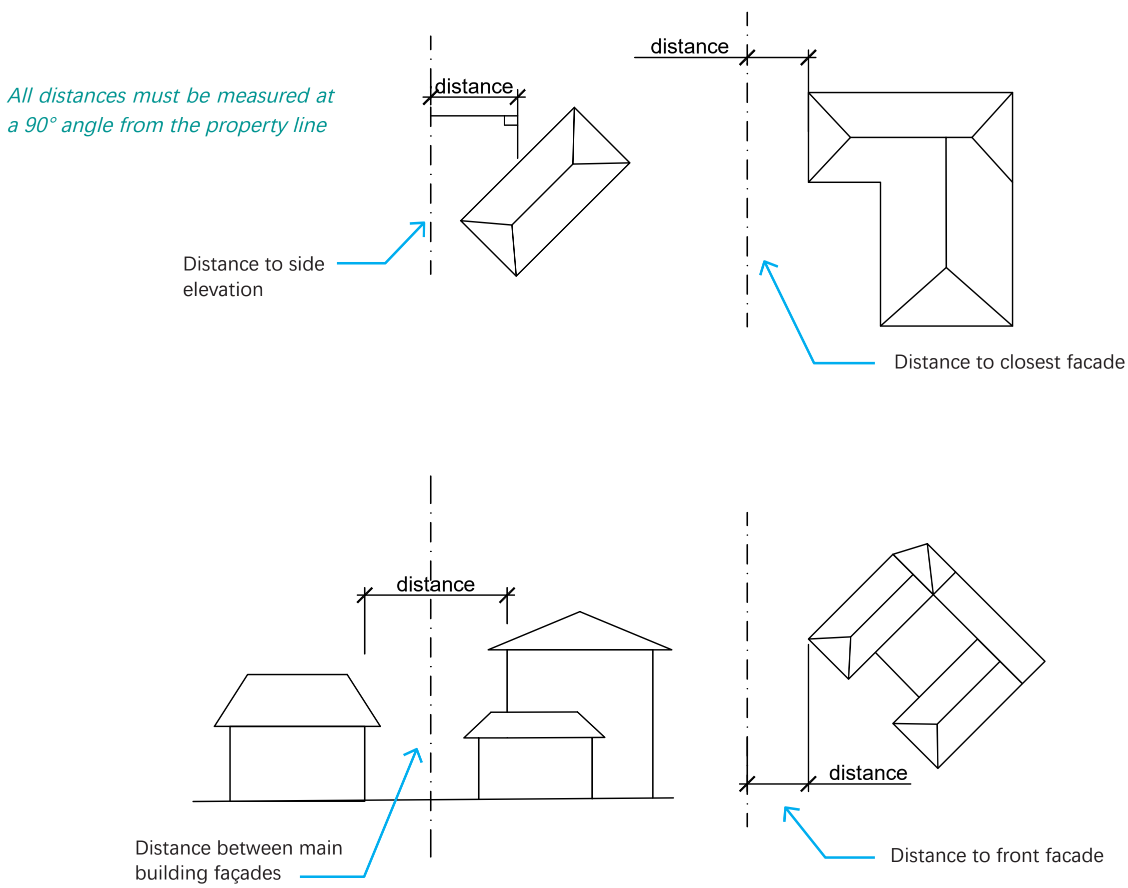
.1 The distance from any point on an External Wall of a Building to a property boundary or another Building is the distance to that point measured along a line at right angles from the starting point of measurement.

.2 Where a wall within a specified distance is required to be constructed in a certain manner, only that part of the wall (including any openings) need be constructed in that manner.

.3 Where the distance measured is between buildings of different heights, the distance must be taken from the External Wall with the highest elevation measured at right angles to the External Wall of the other Building.

.4 Only the wall facing or parallel to the property boundary or other Building must be constructed in a particular manner.

Figure A1: Measurement of Distances to the Property Line



Occupancy Calculations

In some situations, a numerical value for occupancy must be known in order to determine the suitability of a building type, function, or use within.

Occupancy can be calculated by using an Occupancy Rate, which is a hypothetical number assigned to different building types and uses, representing the maximum number of people that can be safely contained within a room or building.

The Occupancy Rates for the NBC shown in Table A1 are based on Occupancy Rates determined by best practice in the Australian and New Zealand Building Codes.

Occupancy can be calculated by multiplying the Occupancy Rate in Column 1 by the GROSS FLOOR AREA. These values should then be used to determine whether a proposed BUILDING or FACILITY satisfies the appropriate performance criteria in the NBC.

Table A1: Occupancy Rate Calculations

Occupancy Rate m^2 / person	BUILDING FUNCTION AND CAPACITY
0.3	• Standing room only for a spectator stand / audience viewing area
0.5	• Bar - within 2.0 m of a serving point • Dance floor • **Stadium** Spectator stand - bench seating
1.0	• **Assembly** area (multi-function room in a **School**, church, theatre, public hall) • Bar - open area without seating • Cafe / restaurant / cafeteria / dining room - seating areas • Court room - public seating • Kiosk • Spectator stand - removable seating
1.5	• Swimming Pool
2.0	• Board room • Reading room (ie, in a library or **Office**) • **School** classroom • Transport terminal
3.0	• Gymnasium • **Retail**, **Commercial**
4.0	• Art gallery • Early Childhood Centre • Exhibition Area • Museum • **School** - trade and practical areas
5.0	• Dormitory • Theatre - dressing Room
10	• Court room - judicial area • **Health-Care** and **Aged-Care** - patient care areas • Indoor sports **Stadium** - arena • **Industrial** - machine shop, fitting shop or the like for cutting, grading, finishing or fitting of metals or glass, except in the fabrication of structural steelwork or manufacture of vehicles or bulky products • Kitchen • Laboratory • Laundry • **Office** • **School** - staff room • Showroom
15	• **Communal Residential** • **Fale Tourist Accommodation** • **Tourist Accommodation**
25	• Computer room
30	• **Carpark** • **Storage** • SITE SERVICING room (electrical, ventilation, switch room, transformer room or other services) • Workshop
50	• Boiler room • **Industrial** - automated fabrication, processing, storage • Power plant

Occupancy calculation will exclude the following:

(a) lifts, stairways, ramps, escalators, corridors, hallways, lobbies and the like

(b) service cuts, unoccupied utility rooms, SANITARY COMPARTMENTS or other ancillary uses

Climate Change Adaptation

The primary issue facing the health and safety of citizens and the environment in Samoa in the coming decades is the consequences of CLIMATE CHANGE. Rising temperatures in the air and water, and a rising sea level could have devastating impacts on many places in Samoa, particularly for villages located along the coastline.

Throughout the NBC, a proactive stance has been taken to deal with the impacts of CLIMATE CHANGE by ensuring that BUILDINGS, FACILITIES and SITES are constructed to minimise impacts, as shown in Figure A2 below. Some of the CLIMATE CHANGE ADAPTATION provisions include: appropriate placement of buildings on the site, earthworks that minimise devastating impacts of stormwater, energy efficient building materials, RENEWABLE ENERGY, passive solar design, GREEN ROOFS and a reduction in GREENHOUSE GAS EMISSION consumption through building design that promotes efficient energy consumption. Ensuring that buildings are resilient to NATURAL DISASTERS (which are predicted to increase in frequency as a result of CLIMATE CHANGE) is also an important part of the NBC.

All DEVELOPMENT projects are required to be constructed, altered and/or demolished according to the provisions for CLIMATE CHANGE resilience in the NBC, to the degree indicated for BUILDING GROUPS and BUILDING FUNCTIONS.

Figure A2 Climate Change Adaptation in the NBC

Climate Change - Potential Impact, Effect and Applicable Sections in the NBC			
	Potential Impact	**Effect**	**NBC Provisions**
1	Rising air temperature	• increase interior temperature in structures • increase demand for cooling • increase in air pollution	• Section H3 Energy Efficiency • Section H4 Renewable Energy • Section H5 Glazing and Windows - Heat Reduction • Section H6 Greenhouse Gas Emission Reduction • Section H7 Green Roofs • Section F2 Air Quality
2	More intense rainfall (tropical storms)	• increase RUNOFF • increase erosion potential, unstable slopes • increase in potential for water penetration in structures	• Section B2 Site Works (Slope Stability, Stormwater Management, and Roof Drainage System) • Section H1 Coastal Protection • Section H2 Weathertight Construction • Section H5 Glazing and Windows - Heat Reduction • Section H7 Green Roofs • Section J5 Natural Disaster Resilience
3	More frequent cyclones	• increase potential for structural damage by wind, rain, STORM SURGE, RUNOFF • increase erosion potential, unstable slopes	• Section B1 Structure • Section B2 Siteworks (Slope Stability, Stormwater Management, and Roof Drainage System) • Section B4 Building Material • Section H1 Coastal Protection • Section H2 Weathertight Construction • Section J Natural Disaster Resilience
4	Increase in hail storms	• potential increase in damage to roofs, EXTERNAL WALLS, windows, doors	• Section B1 Structure • Section B4 Building Material
5	Sea level rise	• increase STORM SURGE, FLOODING • risk to stability of structures	• Section B1 Structure • Section B2 Siteworks (Slope Stability, Stormwater Management, and Roof Drainage System) • Section H1 Coastal Protection • Section H2 Weathertight Construction • Section J Natural Disaster Resilience
6	Increase in humidity	• increase for pathogens, smog and contaminated air	• Section F2 Air Quality • Section F3 Wet Area Health and Safety • Section H2 Weathertight Construction
7	Decrease in humidity	• increase in drought conditions • more frequent fire events	• Section C Fire Protection • Section J Natural Disaster Resilience (bushfire)
8	Increase in deforestation	• unstable slopes due to increase loss of trees from drought and disease	• Section B2 Sitework (Slope Stability) • Section J Natural Disaster Resilience

How to Use the NBC

Builders, designers, landowners and citizens of Samoa should use the NBC as an information tool that provides minimum standards for health and safety for the safe construction, alteration or demolition of a DEVELOPMENT project.

All parts of the NBC should be referenced often as the provisions for a particular BUILDING or BUILDING ELEMENT will be spread among a number of sections and definitions.

A step-by-step example of how to use the NBC for any DEVELOPMENT project is provided in Figure 1.

Figure A3 Example of How to Use the NBC (for any DEVELOPMENT project)

Management Objectives	Applicable Section in NBC	Recommended Actions
STEP 1	Go to Section A1	• determine BUILDING FUNCTION (eg. **Residential**, **Commercial**, **Tourist Accommodation**, etc.)
STEP 2	Go to Section A2	• determine BUILDING GROUP number (eg. **Schools** with more than 30 students are in BUILDING GROUP 2} based on scale and use
STEP 3	Go to first page of Sections B to K	• determine provisions in each Section applicable to the BUILDING FUNCTION by reviewing the chart opposite the Table of Contents for that section
STEP 4	Go to each Section applicable to the BUILDING FUNCTION	• note all requirements (objectives and PERFORMANCE REQUIREMENTS) • note any DEEMED-TO-SATISFY PROVISIONS that you may choose to use appropriate for the BUILDING FUNCTION and the BUILDING GROUP • note any ACCEPTABLE SOLUTIONS you may choose to use • determine if an ALTERNATIVE SOLUTION is the best option to achieve the PERFORMANCE REQUIREMENTS (instead of the DEEMED-TO-SATISFY-PROVISONS or ACCEPTABLE SOLUTIONS)
STEP 5	Go to applicable provisions in Sections B to K	• start design and layout of BUILDING and site, refer to notes and specific provisions again to refine design to meet objectives and the PERFORMANCE REQUIREMENTS
STEP 6	Go to applicable provisions in Sections B to K	• finalise design drawings for the BUILDING PERMIT and note PERFORMANCE REQUIREMENTS that are satisfied. • prepare tender drawings and note all health and safety provisions in the NBC that must be following during construction.
STEP 7	Go to applicable provisions in Section B	• during construction, consult tender drawings and the NBC to ensure that all health and safety requirements are provided
STEP 8	Go to applicable provisions in Sections B to K	• during the LIFESPAN of the BUILDING, consult the NBC to ensure that maintenance provisions are satisfied
STEP 9	Go to applicable provisions in Sections B to K	• for demolition, follow procedures and provisions in the NBC for a Demolition Plan, and for the execution of the Demolition Plan.

Interpretation

Capitalisation and colourising certain words has been done throughout Sections A to K to indicate the following:

(a) CAPITALISED words - are defined in Section A3 Definitions

(b) **Bold Purple Colour Words** - indicate it is a BUILDING FUNCTION as defined in Section A1

(c) non-capitalized words - have the same meaning as found in the latest version of Webster's Dictionary

For all lists, every item in the list applies to that particular provision unless otherwise indicated. For example, Items (a), (b) and (c) in the list above all apply, whereas the following list indicates that a choice can be made:

a) red bricks, or

(b) blue bricks, or

(c) yellow bricks

Section A

Core Provisions

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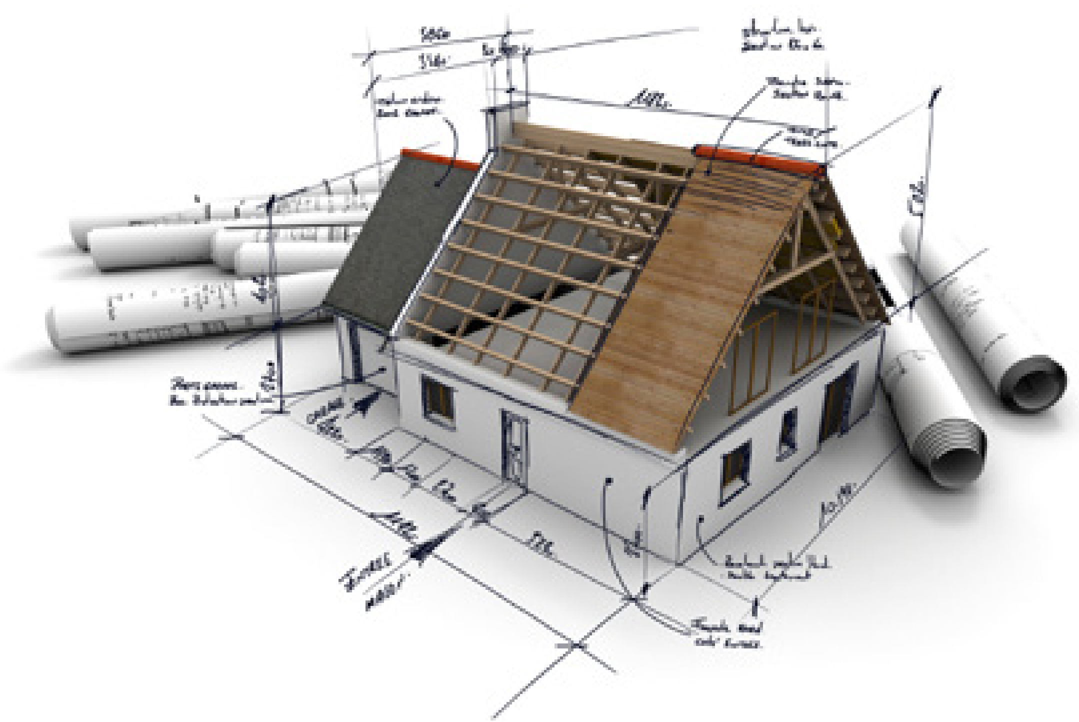

A1 Building Functions

DEVELOPMENT projects referred to in the NBC have specific provisions and regulations due to the USE of the BUILDING, FACILITY or SITE, and associated implications for the health and safety of occupants, the environment, adjacent property and people. The following definitions for BUILDING FUNCTION are applied universally within the NBC:

Aged-Care Building a place where the primary purpose is the **Residential** accommodation of aged persons who are provided with personal care services and 24-hour staff assistance to evacuate in case of an emergency

Assembly Building a place where people assemble for:

(a) civic, theatrical, social, political or religious purposes, including a cinema
(b) entertainment, recreational or sporting purposes
(c) transit purposes other than a roadside bus stop such as an airport and transit terminal

Carpark structure used for the parking of motor vehicles but is neither a PRIVATE GARAGE nor used for the servicing of vehicles other than washing, cleaning or polishing

Open-deck Carpark a **Carpark** in which every STOREY is cross-ventilated by permanent unobstructed openings in not fewer than two opposite or approximately opposite sides, and:

(a) where each side that provides, ventilation is not less than 1/6 of the area of any other side
(b) the openings are not less than 1.2 of the wall area

Commercial Building a place where any natural resource, goods, services or money are developed, sold, exchanged or stored, including an amusement park, auction room, bank, CARPARK, catering facility, coffee bar, computer centre, funeral parlour, hairdresser, post office, public BUILDINGS (police station, fire station, library, government **Office**), public laundry, radio station, restaurant, service station, shop, showroom, television station, transport terminal and **Tourist Accommodation**

Communal Residential living accommodation for a number of unrelated persons in a BUILDING, excluding **Tourist Accommodation**, **Health-Care**, and **Aged-Care Buildings**

Fale a structure built in the traditional Samoan style in accordance with customary designs and structural methods of the Samoan people, consisting of a single STOREY with one main rounded or hip-style roof supported by wooden posts

Open Fale (faleo'o) a FALE with all of the following features:

(a) used for domestic purposes
(b) stone foundation or raised wood platform FRAMING
(c) wood posts with no CLADDING/walls
(d) maximum GROSS FLOOR AREA of 24 m^2
(e) traditional roof construction with wood poles and thatch, or corrugated metal roof with rafters

A BUILDING PERMIT is not required for the construction of an **Open Fale (faleo'o)**, but will be required for any other SITEWORK associated with the DEVELOPMENT, including ON-SITE WASTEWATER MANAGEMENT and any other structure on the SITE. In addition, the **Open Fale (faleo'o)** may be subject to a Development Consent approval from the appropriate government authority

Regulated Fale: a **Fale**, or **Fale** extension, which includes any of the following features:

(a) used for any purpose other than domestic
(b) GROSS FLOOR AREA greater than 24 m^2
(c) wood posts with CLADDING/walls
(d) metal posts
(e) includes PLUMBING, electricity, and/or air conditioning

A **Regulated Fale** is subject to all provisions in the NBC and a BUILDING PERMIT is required.

Fale Tourist Accommodation a type of tourism DEVELOPMENT consisting of one or more **Open Fales** that serve as sleeping accommodation, along with associated facilities and services for guests

Health-Care Building a place where the primary purpose is health and care, including:

(a) hospital, convalescent home, infirmary or similar institution or home for sick persons or those with disabilities needing full-time nursing care
(b) a clinic or day surgery unit where:
   (i) prescribed surgical procedures are performed on people as in-patients who do not require overnight care
   (ii) surgical procedures may include general anaesthesia, major regional anaesthesia or intravenous sedation

Heritage Building a structure of great historical, cultural and/or artistic value that has official protection to prevent it from being changed or destroyed

Industrial Building a BUILDING designed to produce, manufacture, store, test, and/or operate a product and provides the necessary conditions for workers and the operation of equipment

Major Infrastructure applies to a structure not for human habitation including a bridge, derrick, tunnel, dam, jetty, wharf, port, boardwalk, SEAWALL and recreational activity

Minor Structures are those associated with a SITE but not attached to the main BUILDING or FACILITY, and may be used for any BUILDING FUNCTION but not for HABITABLE use, including a carport, detached PRIVATE GARAGE, gazebo, shade structure, machinery or equipment room, TOILET or SANITARY COMPARTMENT, free-standing outdoor fireplace or permanent oven, private swimming pool, greenhouse, farm BUILDING, retaining wall and fence

Mixed Use Building an enclosed structure containing two or more **Residential, Commercial**, **Retail**, **Assembly, Industrial** or other uses, either physically and functionally integrated or located in separate UNITS

Multiple Unit Building a BUILDING which contains more than one **Single Occupancy Unit**

Multiple Unit Residential Building a **Multiple Unit Building** where each UNIT is used for **Residential** purposes

Office a BUILDING containing predominantly employment-oriented activities that do not involve fabrication or production of goods

Retail Building a single BUILDING or UNIT with a GROSS FLOOR AREA less than 50 m^2 where goods, services or money are either developed, sold, exchanged or stored, including any of the BUILDING types listed in the **Commercial Building** description

Residential a room, group of rooms or one or more **Single Occupancy Units** used primarily for human habitation

School a place where the primary purpose is education including a primary or secondary SCHOOL, college, university or similar, training centre or similar educational establishment

Single Occupancy Unit a room, group of rooms, or BUILDING occupied by one owner, lessee, tenant, family or other occupier

Single Unit Residential every **Single Occupancy Unit** within the structure is used primarily for **Residential** purposes

Stadium a type of **Assembly Building** used for viewing an event that may be enclosed or open-air

Storage Building a type of **Industrial Building** whose primary use is for the storage of goods

Temporary Structure a booth, tent or other temporary enclosure that is not intended to be permanently located on a site, including a mobile vehicle used for commercial purposes

Tourist Accommodation a room, BUILDING or group of BUILDINGS providing overnight accommodation, food, and services for one or more guests

5 Types of Built Form regulated in the NBC:

BUILDING any structure supported by walls, pillars, posts or columns and covered by a roof used for human occupation or shelter including all uses listed in the Building Functions except for **Minor Structures**, **Major Infrastructure** and **Temporary Structures**

FACILITY any non-habitable structure (permanent or temporary), including fire and life-safety systems, exterior **Storage Buildings**, tanks and areas, equipment and processes dealing with flammable and COMBUSTIBLE substances and HAZARDOUS SUBSTANCES exterior to the BUILDING, **Minor Structures** and **Temporary Structures**

SITE the land occupied or to be occupied by a BUILDING or FACILITY, including all land within the legal boundaries, all natural elements, all SITEWORK, and all SITE SERVICING

SITEWORK earthworks and other activities preparatory to or associated with the construction, alternation, demolition or removal of a BUILDING, FACILITY or SITE SERVICING

SITE SERVICING mechanical or electrical system in a BUILDING, FACILITY or SITE that consists of one, some, or all of PLUMBING (water supply and WASTEWATER removal/treatment), electrical, STORMWATER MANAGEMENT, telecommunications

A2 Building Groups

BUILDINGS are classified according to building type, function and scale. Different PERFORMANCE REQUIREMENTS may apply to different BUILDING GROUPS.

Mixed Used Buildings are subject to all relevant PERFORMANCE REQUIREMENTS of each BUILDING FUNCTION in the BUILDING GROUP. For example, a **Mixed Used Building** containing 8 **Residential** units and a 150 m^2 assembly space would have the **Residential** component subject to BUILDING GROUP 3, and the **Assembly** room subject to BUILDING GROUP 2.

Where there is a question of which PERFORMANCE REQUIREMENTS are applicable in a **Mixed Used Building** or other site with multiple Building Functions or activities, the higher and more stringent standards apply.

Table A2: Building Group Categories

Building Group	Description	Structures
1	BUILDINGS, FACILITIES or **Major Infrastructure** whose function serves a large area or large number of people in Samoa	• **Major Infrastructure**, including hydroelectric dams and other dams whose failure would result in loss of human life, SEAWALLS, ports, bridges and tunnels • Extremely HAZARDOUS facilities adjacent to large populations • BUILDINGS having critical national defence functions • power generating stations, solar installations and other utilities required for emergency backup • aviation control towers, air traffic control centres, and emergency aircraft hangars • water treatment facilities required to maintain water pressure for fire suppression and/or supply drinking water
2	BUILDINGS and FACILITIES that are essential to post-DISASTER recovery or the primary function is storage or handling of HAZARDOUS SUBSTANCES BUILDINGS with activities that affect large groups of people in a village	• hospitals and other **Health-Care Buildings** having surgery or emergency treatment facilities • fire, rescue and police stations, and emergency vehicle garages • BUILDINGS used as emergency shelters • BUILDINGS used for communication and operation centres in an emergency, and other facilities for emergency response • BUILDINGS in which the use, storage or handling of HAZARDOUS SUBSTANCES capable of causing acutely HAZARDOUS conditions that extend beyond property boundaries • **Tourist Accommodation** (a BUILDING with more than 8 guest rooms) • accommodation for the aged, disabled, disadvantaged or children (greater than 250 m^2) • **School** with more than 30 students, including classrooms, laboratories, gymnasiums, halls and ablutions
3	BUILDINGS which may house groups of people, vulnerable populations, or fulfil a role of importance to the community or village	• **Communal Residential Buildings** (greater than 350 m^2) • **Multiple Unit Residential Building** (with more than 4 UNITS) • **Assembly Buildings** (greater than 150 m^2) • **Tourist Accommodation** (a BUILDING with 1-8 guest rooms) • **Aged-Care Building** accommodation for disabled and/or the elderly (250 m^2 or less) • **Office** / **Commercial** (greater than 350 m^2) • **Mixed Use Buildings** (greater than 350 m^2) • **Industrial** / **Storage Buildings** (greater than 350 m^2) • **Heritage Buildings**
4	BUILDINGS which accommodate a low number of people, or with a low replacement cost	• **Communal Residential Building** (350 m^2 or less) • **Multiple Unit Residential Building** (4 UNITS or less) • **Assembly Buildings** (150 m^2 or less) • **Fale Tourist Accommodation** (other than **Open Fales** which are not subject to the NBC) • **Retail** and kiosk-type shop (50 m^2 or less) • **Office** / **Commercial** (350 m^2 or less) • **Mixed Use Building** (350 m^2 or less) • **Industrial** / **Storage Buildings** (350 m^2 or less) • **Minor** and **Temporary Structures** • **School** housing two classrooms or less
5	Samoan **Fales** and **Single Unit Residential**	• **Open Fale (faleo'o)** - BUILDING PERMIT not required • **Regulated Fale** • **Single Unit Residential**

A3 Definitions

Some of the words and phrases used in the NBC have specific defined meanings. Wherever such meaning is intended the words and phrases are printed in capital letters. The defined meanings are:

Acceptable Solution means a solution that is accepted as complying with the NBC

Accessible having features to permit use by a PERSON WITH A DISABILITY

Accessible Exit - see EXITS

Accessible Route a walkway, ramp, hall, PUBLIC CORRIDOR, landing, entry or EXIT designed to safely permit a PERSON WITH A DISABILITY to enter and travel through the BUILDING, FACILITY or SITE

Accessible Unit a room, rooms, or other part of a BUILDING occupied by one owner, lessee, tenant, or the like, with features that do not restrict a PERSON WITH A DISABILITY from using the BUILDING for its intended use, including an ACCESSIBLE EXIT, ACCESSIBLE ROUTE, and ACCESSIBLE BATHROOM (where appropriate)

Aerial Conductor - see Electrical

Air Space the open area between BUILDING MATERIALS in the construction of roofs, walls, ceilings and floors deliberately intended to create a sound or temperature INSULATION barrier

Airtight not allowing air to escape or pass through

Alternative Solution one that is compliant with the NBC but is not listed as a DEEMED-TO-SATISFY PROVISION or an ACCEPTABLE SOLUTION.

Approval Authority a person or organisation of persons having recognised and certified qualifications and experience to determine whether a proposed DEVELOPMENT complies with PERFORMANCE REQUIREMENTS of the NBC, and/or to set standards for health and safety regarding any aspect of building and site construction

Atria / Atrium space within a BUILDING that connects 2 or more STOREYS, and is wholly or substantially enclosed at the top by a floor or roof (including a glazed roof structure), and does not include a stairwell, ramp or a SITE SERVICING SHAFT

Automated / Automatic any part of a FIRE SAFETY SYSTEM, including a FIRE DOOR, SMOKE DOOR, FIRE SHUTTER, smoke and-heat vent, COMPLIANT SPRINKLER SYSTEM, FIRE ALARM system or the like, designed to operate when activated by a heat, smoke or fire sensing device

Automated Access any motorised means of conveying people or goods, including lifts, escalators, moving walkways, ramps, inclined platform lifts, etc., or allowing access to a BUILDING, FACILITY or SITE, including AUTOMATIC doors, windows, gates and turnstiles

Automatic Fire Alarm - see FIRE SAFETY SYSTEM

Automatic Fire Suppression - see FIRE SAFETY SYSTEM

Baluster a vertical support for a HANDRAIL

Bathroom room in a BUILDING or FACILITY, or a stand-alone structure, containing at least a TOILET and a means of personal hygiene (wash basin, sink, tap with running water), and may include other means of personal hygiene such as a shower or bathtub, and associated facilities such as a hot tub or sauna

Bio-energy a source of energy derived from the fermentation of organic matter

Building - see definition on page A-3

Building Element primary structural frame members, LOAD-BEARING WALLS, COMMON and INTERIOR WALLS, FIRE WALLS, floor and/or roof construction including secondary members, EXIT construction, foundations, and windows

Building Exit - see EXITS

Building Group a classification of BUILDINGS of similar types, functions, scale, uses and/or occupancy

Building Material any substance used for construction, alteration or repair of a BUILDING, FACILITY or SITE SERVICING, including natural and synthetic substances, fasteners, adhesives, and hardware

Building Permit document issued by the Government of Samoa allowing the construction, alteration or demolition of a BUILDING, FACILITY, SITEWORKS, SITE SERVICING and/or SITE to proceed according to conditions of the BUILDING PERMIT

Building Regulations a set of standards and procedures issued by the Government of Samoa outlining requirements for the DEVELOPMENT process including plan submission and regulations for BUILDING PERMIT application.

Busbar - see Electrical

Cable - see Electrical

Catenary Wires - see Electrical

Carbon Footprint the amount of GREENHOUSE GAS EMISSIONS produced by a human activity, such as construction, operation and demolition of BUILDINGS, FACILITIES, SITES and SITE SERVICING

Certificate of Accreditation a certificate issued by an approved body acceptable to the Government of Samoa stating that the properties and performance of a BUILDING MATERIAL, design or method of construction fulfils requirements of the NBC

Circuit/ Circuitry - see Electrical

Cladding exterior surface of a BUILDING attached to EXTERNAL WALLS, the roof, or any other exterior surface

Climate Change long-term variations in global temperature and weather pattern both natural and as a result of human activity, resulting in impacts on the environment, mostly detrimental

Climate Change Adaptation actions or plans instigated to mitigate impacts of CLIMATE CHANGE

Coastal Flood Level - see FLOOD

Coastal Zone - see FLOOD

Combustible a material that ignites and burns easily when exposed to elevated temperatures, that has been subjected to the test conditions of AS 1530.1 and has exceeded flaming or temperature rise limits specified in that Standard

Commissioning a QUALITY ASSURANCE program that tests and validates the performance of AUTOMATED and mechanical systems and SITE SERVICING within a BUILDING, FACILITY or on SITE

Common Wall - see WALL

Compliant Sprinkler System - see FIRE SAFETY SYSTEM

Conduit - see Electrical

Conductors / Conductive - see Electrical

Current - see Electrical

Curtain Wall - see WALL

Dead Load the weight assigned to the BUILDING ELEMENTS of a BUILDING, STOREY or ROOM excluding people or goods

Deck an open platform projecting from an EXTERNAL WALL of a BUILDING and supported by FRAMING and may be open underneath or partially or fully enclosed

Deemed-to-Satisfy Provision means a provision that is deemed to satisfy the PERFORMANCE REQUIREMENTS

Design Flood Level - see FLOOD

Desludge / Desludging removal of accumulated SLUDGE and scum from the septic

Development includes the use of land (whether for a long term or temporary purpose), the erection of a BUILDING or other structure, the carrying out of a work, subdivision, and any other activity regulated under the NBC

Disaster circumstances that arise from any happening, whether natural or otherwise, which involves threat or danger to human life or health, or to the environment, and which might require EMERGENCY RESPONDERS to take action, including:

(a) any NATURAL DISASTER affecting the whole or any part of Samoa
(b) any fire caused by any means
(c) any event, natural or otherwise, which threatens the supply of water or the quality of water resources in Samoa
(d) any unforeseen or unusual event involving HAZARDOUS SUBSTANCES

Disaster Resilient / Disaster Resilience ability of a BUILDING, FACILITY, SITEWORK, SITE SERVICING and amenities on SITE to withstand the consequences of a DISASTER and recover its essential basic structures and functions in a timely and efficient manner

Discharge Area a DRAINAGE DITCH, swale, field, body of water, or the like, that is the final destination for the disposal of GREYWATER, WASTEWATER or STORMWATER

Distribution Switchboard - see Electrical

Drainage Ditch an open channel lower in elevation that the surrounding land intended to collect and convey stormwater on private or public property

Durability / Durable the safe performance of a BUILDING, FACILITY or SITE for the designed life expectancy assuming the design and a regular schedule of maintenance activities is conducive with site conditions, and that does not result in unforeseen cost for maintenance and repair

Earth Electrode - see Electrical

Earthed / Earthing - see Electrical

Earthing Conductor, main and protective - see Electrical

Eaves part of the roof that extends beyond the exterior face of the wall including CLADDING, FASCIA and GUTTERS

Electrical

Aerial Conductor any stranded CONDUCTOR supported by insulators or purpose-designed fittings above the ground directly exposed to the weather

Busbar metallic strip or bar (typically copper, brass or aluminium) that conducts electricity within a SWITCHBOARD

Cable two or more wires running side by side and bonded, twisted or braided together to form a single assembly

Catenary Wires system of WIRING consisting of a CABLE or CABLES attached at intervals to a suitable support that is suspended between two points

Circuit/Circuitry a system of LIVE CONDUCTORS, protective CONDUCTORS (if any), a protective device and associated switchgear, control-gear and accessories, that create a closed loop giving a return path for the CURRENT

Conductive / Conductors wire or other form of conducting material that allows the flow of CURRENT in one or more directions, but not including wire or other metallic parts directly employed in converting electrical energy into another form

Conduit a tube or trough protecting electrical WIRING

Current a flow of electrical charge

Distribution Switchboard a SWITCHBOARD other than the MAIN SWITCHBOARD

Earthed / Earthing a system designed to protect electrical wires, components and equipment from damage caused by sudden electrical power surges and reduce the risk of electrical shock from uninsulated metal parts consisting of an intentional connection from a CIRCUIT CONDUCTOR to the earth (EARTH ELECTRODE)

Earthing Conductor, Main a CONDUCTOR connecting to the main EARTHING terminal/connection or bar to the EARTH ELECTRODE or the EARTHING system of the electrical supply

Earthing Conductor, Protective a CONDUCTOR, other than a MAIN EARTHING CONDUCTOR, connecting any portion of the EARTHING system to the portion of the ELECTRICAL INSTALLATION or ELECTRICAL EQUIPMENT required to be EARTHED, or to any other portion of the EARTHING system

Earth Electrode metal plate, water pipe or other CONDUCTOR partially buried in the earth to provide a reliable conductive path to the ground

Electrical Equipment WIRING systems, switchgear, control-gear, accessories, appliances, luminaires, and fittings used for generation, conversion, storage, transmission, distribution or utilisation of electrical energy

Electrical Installation permanently attached electrical appliance, equipment, WIRING and components used in the reticulation of electricity

Equipotential Bonding electrical connections intended to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, but not intended to carry electrical CURRENT in normal service

Extra Low Voltage / ELV an electrical potential that carries a low risk of electrical shock

Fault a CURRENT resulting from an INSULATION failure or from the bridging of INSULATION

IPX rates the degree of protection provided from dust, accidental contact, and water by mechanical casings and electrical enclosures

Live carrying or charged with electricity

Low Voltage / LV an electrical potential not large enough to cause injury or damage if diverted, usually used for lighting or appliances

Main Switch a mechanical or electronic device for making, breaking or changing the electrical connection from the main electrical supply (RETICULATED and/or ALTERNATIVE ENERGY) to the electrical system

Main Switchboard a SWITCHBOARD receiving and controlling the electrical supply (RETICULATED and/or ALTERNATIVE ENERGY) for the entire BUILDING, FACILITY and/or SITE

Overcurrent a CURRENT exceeding the rated value

Protected Extra-Low Voltage / PELV an extra-low voltage system that is not electrically separated from earth, but that otherwise satisfies all the requirement for SELV

Residual Current Device / RCD a device that disconnects a CIRCUIT whenever it detects that the electric CURRENT is not balanced

Ripple-free d.c. for sinusoidal ripple voltage, a ripple content not exceeding 10% r.m.s

Separated Extra-Low Voltage / SELV an extra-low voltage system that is electrically separated from earth and from other systems in such a way that a single FAULT cannot give rise to the risk of electric shock

Submain a CIRCUIT originating at a SWITCHBOARD to supply another SWITCHBOARD

Switchboard a device that directs electrical CURRENT from one or more sources of supply to one or more SUBMAINS or CIRCUITS, with or without switchgear or connecting devices, and incorporates protective measures such as fuses

Wiring an arrangement of wires used for electrical distribution

Wiring Enclosure a pipe, tube, duct, CONDUIT or CABLE trunking that is fixed or supported in position in accordance with the provisions in this Code and provides protection of sheathed or unsheathed CABLES

Electrical Equipment - see Electrical

Electrical Installation - see Electrical

Emergency Exit - see EXIT

Emergency Lift platform or compartment housed in a FIRE-ISOLATED SHAFT for raising and lowering people or things to

different floors or levels, used in TALL BUILDINGS with an FRL of 120/120/120 and a carrying capacity of 600 kg minimum

Emergency Responders trained people who are likely to be the first to arrive at and assist at the scene of an emergency such as a fire or DISASTER

Encroachment any construction that protrudes beyond the EXTERNAL WALL of a BUILDING or FACILITY into a SETBACK from the property boundary that restricts BUILDING construction

Energy Efficient / Energy Efficiency refers to a BUILDING MATERIAL, BUILDING ELEMENT or SITE SERVICING that is composed of, uses, or operates, with less energy expended than similar products

Essential Facility BUILDINGS, FACILITIES, PLUMBING and utilities intended to remain in operation in the event of a fire or other DISASTER

Equipotential Bonding - see Electrical

Evacuation Route a continuous path of travel consisting of FIRE-RESISTANT construction (which may include FIRE-ISOLATED PASSAGEWAYS, FIRE-ISOLATED RAMPS, EMERGENCY EXITS, FIRE DOORS, SMOKE DOORS, SMOKE LOBBIES) from any HABITABLE part of a BUILDING or **Single Occupancy Unit** to a PLACE OF SAFETY

Evacuation Time the time between the occurrence of a fire or DISASTER and the time needed for the last person to reach a PLACE OF SAFETY or leave the BUILDING or STRUCTURE

Exit any, or any combination of the following that provides egress from a BUILDING or FACILITY:

(a) **Accessible Exit** a BUILDING EXIT constructed to allow safe passage for PERSONS WITH A DISABILITY

(b) **Building Exit** an opening providing access to and from a BUILDING or FACILITY

(c) **Emergency Exit** SELF-CLOSING, FIRE-RESISTANT door initiated by the FIRE SAFETY SYSTEM

(d) **Fire Window** a window that opens to the outside of a structure that has an opening sufficient in size for EMERGENCY RESPONDERS to crawl through in the event of an emergency

(e) **Horizontal Exit** a FIRE RESISTANT doorway through an internal FIRE WALL

External Wall - see WALL

Extra Low Voltage - see Electrical

Facility - see definition on page A-3

Fault - see Electrical

Finished Floor top surface of the material attached on top of the structural members of floor construction

FRL - see FIRE RESISTANCE LEVEL

Fascia a material covering the end of roof supports extending past the EXTERNAL WALLS

Fire Access Route a road that provides access from a fire station to a BUILDING or FACILITY that may include other terms such as fire lanes, public and private streets, parking lot lanes and access roadway

Fire Blanket - see FIRE SAFETY SYSTEM

Fire Compartment the total space of a part of a BUILDING that is separated from the remainder by barriers to fire such as FIRE WALLS and/or floors, having an appropriate resistance to the spread of fire and smoke with openings adequately protected and EMERGENCY EXITS provided

Fire Control Centre - see FIRE SAFETY SYSTEM

Fire Control Panel - see FIRE SAFETY SYSTEM

Fire Curtain - see FIRE SAFETY SYSTEM

Fire Door a SELF-CLOSING door with an approved FRL used in an EVACUATION ROUTE and to provide access to an EVACUATION ROUTE that is ACCESSIBLE

Fire Hazard means the danger in terms of potential harm and degree of exposure arising from the start and spread of fire and the smoke and gases that are thereby generated

Fire Hose Reel - see FIRE SAFETY SYSTEM

Fire Intensity the rate release of calorific energy in watts, determined either theoretically or empirically, as applicable

Fire-Isolated Passageway a PUBLIC CORRIDOR which provides egress to or from a common area or UNITS in a BUILDING to a FIRE-ISOLATED STAIRWAY and/or RAMP, EMERGENCY EXIT, or PLACE OF SAFETY

Fire-Isolated Ramp an inclined PUBLIC CORRIDOR of FIRE RESISTANT construction within an EVACUATION ROUTE

Fire-Isolated Shaft a SHAFT that is FIRE RESISTANT and constructed to be as AIRTIGHT as possible

Fire-Isolated Stairway a stairway within a FIRE-ISOLATED SHAFT

Fire Load the sum of the net calorific values of the COMBUSTIBLE contents which can reasonably be expected to burn within a FIRE COMPARTMENT, including furnishings, built-in and removable materials, and BUILDING ELEMENTS. The calorific values must be determined at the ambient moisture content or humidity (in MJ (megajoules)).

Fire Protective Covering inert material (such as plasterboard, cellulose fibre reinforced sheeting, etc.) applied in such a manner that it protects other materials or BUILDING ELEMENTS from the damaging effects of fire

Fire Pump - see FIRE SAFETY SYSTEM

Fire Resistance ability of a BUILDING ELEMENT, BUILDING MATERIAL, finish or coating to resist a fully developed fire while still performing its structural function

Fire Resistant applied to a BUILDING ELEMENT, BUILDING MATERIAL, finish or coating, means having an FRL (FIRE RESISTANCE LEVEL) appropriate for that element

Fire Resistance Level, also referred to as FRL ability of a BUILDING ELEMENT, BUILDING MATERIAL, finish or coating to resist fire as measured in elapsed time (minutes) until failure in accordance with Specification A2.3 of Building Code of Australia, with regard to:

(a) ***Structural Adequacy*** - ability of a LOAD-BEARING BUILDING ELEMENT or BUILDING MATERIAL to continue supporting an intended load during a fire

(b) ***Integrity*** - ability of a BUILDING ELEMENT or BUILDING MATERIAL to resist the passage of heat, flame and gases from an area exposed to fire to another area not exposed to fire

(c) ***Insulation*** - ability of a BUILDING ELEMENT or BUILDING MATERIAL to maintain a temperature on a surface below the limits specified in AS 1530.4

and expressed in that order, for example 60/60/60

Fire Retardant a substance that reduces flammability of fuels, BUILDING MATERIALS and ASSEMBLIES, or delays their combustion, including chemical agents, fire-fighting foams and fire-retardant gels

Fire Safety and Evacuation Plan document prepared for a BUILDING, FACILITY and/or SITE describing methods and procedures for operation and maintenance of the FIRE SAFETY SYSTEM, and safe evacuation of the BUILDING, FACILITY and/or SITE in case of an emergency

Fire Safety System a number of devices working together to detect and warn people through visual and audio devices when smoke, fire and carbon monoxide are present, along with equipment to extinguish a fire. Components in a FIRE SAFETY SYSTEM may include:

Automatic Fire Suppression an AUTOMATIC system that controls and extinguishes fires without human intervention

Automatic Fire Alarm an AUTOMATED audio and sometimes visual warning system triggered by SMOKE DETECTORS that is connected to the FIRE SAFETY SYSTEM, FIRE CONTROL PANEL, and/or FIRE CONTROL CENTRE

Compliant Sprinkler System pressurised water distribution piping system and sprinklers for automatically extinguishing fires that complies with Specification E1.5 of the Building Code of Australia, Volume 1, and/or Section NE1.5 of the New Zealand Building Code

Fire Blanket sheet of FIRE-RESISTANT flexible material, stored in a cupboard or the like, used to smother a fire

Fire Control Centre an enclosure in a TALL BUILDING containing the FIRE CONTROL PANEL and other components necessary for EMERGENCY RESPONDERS to use to control the spread of fire, smoke and other toxic, air-borne substances during an emergency

Fire Control Panel a device connected to SMOKE DETECTORS that receives electronic signals that a fire has been detected, and a central command centre for AUTOMATIC FIRE SUPPRESSION, smoke control and evacuation safety

Fire Curtain sheet of FIRE-RESISTANT flexible fabric, stored in a FIRE-RESISTANT container designed specifically for that purpose, that is automatically released to seal an opening when activated by the FIRE SAFETY SYSTEM

Fire Hose Reel manually-operated mechanism in a cabinet or wall-mounted containing a rolled-up fire hose and valves connected to a water supply

Fire Pump mechanism that supplies pressure for a water supply system for firefighting either connected to the RETICULATED water supply piping, or a static water source (e.g., tank, reservoir, lake)

Fire Shutters barrier for openings (door, window, lifts, etc.) composed of FIRE RESISTANT slats that are typically rolled up and hidden from view when not in use and cover the opening when activated by the FIRE SAFETY SYSTEM

Hydrant a connection point from which EMERGENCY RESPONDERS can access a pressurised water supply

Manual Fire Alarm Box a device located on or near a BUILDING that sounds an audible, and sometimes visual warning or alarm when activated by a pull switch, call-button, or the like

Portable Fire Extinguisher a portable device filled with chemicals to extinguish a fire, approved by SFESA (Samoa Fire and Emergency Services Authority)

Riser Main pipe system extending to all floors and the roof of a BUILDING, where appropriate, connected to a water supply that can provide water at adequate pressures and rates of flow for use by EMERGENCY RESPONDERS. A wet RISER MAIN permanently contains pressurised water, while a dry RISER MAIN fills with water when activated

Smoke Alarm an all-in-one, self-contained device, with a detector that senses the hot products of combustion (smoke) and sounds an audible, and sometimes visual warning or alarm when activated, commonly used in **Residential** BUILDINGS

Smoke Control System a mechanical air-handling system that uses fans to produce pressure differences across smoke barriers to inhibit smoke movement across open-style ATRIA such as malls, stages and platforms, assembly seating, and underground parking

Smoke Detector a device that senses the hot products of combustion (smoke) and sends a signal to a building's FIRE CONTROL PANEL

Fire Shutters - see FIRE SAFETY SYSTEM

Fire Wall - see WALL

Fire Window a window constructed to resist a fire of known standard intensity for a specified time and large enough for an EMERGENCY RESPONDER with full equipment to pass through

Flammability Index the index number determined under AS 1530.2

Flash Flood - see FLOOD

Flood an inundation of water on the ground surface above normal levels

> **Coastal Flood Level** hypothetical estimation of the height above typical high tide elevation along the shoreline that would be inundated by water as a result of STORM SURGE, coastal FLOODING, and WATER TABLE saturation, as determined by an APPROVAL AUTHORITY and/or the Government of Samoa
>
> **Coastal Zone** land adjacent to the sea identified by the Government of Samoa as being in the COASTAL ZONE
>
> **Design Flood Level (DFL)** hypothetical estimation of the height (elevation) above ground level that would be inundated by FLOODING as a result of STORM SURGE or rainfall, as determined by an APPROVAL AUTHORITY and/or the Government of Samoa
>
> **Flash flood** a FLOOD that is sudden and unexpected, often caused by sudden local or nearby heavy rainfall that peaks within 2-3 hours of the causative rain
>
> **Flooding** a rise or overflow of water onto lands not normally submerged typically resulting fros a result of heavy rainfall, STORM SURGE, raised GROUNDWATER levels, overflow of river channels, increases in RUNOFF from land or blocked drainage systems, among others.
>
> **Storm Surge** a rise in sea level over and above the predicted astronomical tide generated by a storm or tsunami

Floodplain areas adjacent to rivers and coasts which flood during periods of heavy rain from STORM SURGE

Floor Drain a PLUMBING fixture installed on the floor of a BUILDING, FACILITY or low-lying, flat area of a SITE that accepts and conveys water piping connected to a suitable DISCHARGE AREA or OUTFALL

French Drain a trench filled with aggregate and/or a perforated pipe that collects and conveys STORMWATER and RUNOFF

Framing timber or metal members to which lining, wallboard, INSULATION, CLADDING, flooring or decking is attached, or which support the structure or resist forces applied to it

Fuel Cell a device that produces a continuous electric CURRENT derived from the oxidation of a fuel, such as hydrogen

Fuel Gas Cylinder, also known as Gas Bottle a tank containing compressed gas used as an energy source

Fuel Supply pipes and associated fittings that contain pressurised flammable mixtures of hydrocarbon gases to supply energy for heating and cooling in a BUILDING or FACILITY, including Liquefied Petroleum Gas (propane) and natural gas (methane)

Glazing panes or sheets of glass or other transparent or translucent material installed onto or as part of an EXTERNAL WALL that allows light to pass through from outside a structure to an interior room

Global warming potential (GWP) a comparative measure of how much heat a GREENHOUSE GAS EMISSION traps in the atmosphere relative to the amount of heat trapped by a similar mass of carbon dioxide

Green Building strategies for construction, alteration, operation and/or demolition of a BUILDING, STRUCTURE, SITE, SITEWORK or SITE SERVICING that reduce or remove detrimental impacts on the environment and the people using it

Green Roof a roof containing a vegetated layer of plant material applied directly on top of the roof

Greenhouse Gas Emissions (GHG) gases produced by human activity and natural systems that contribute to global warming of the earth's atmosphere, the most abundant being water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFC)

Greywater household waste water from sinks, baths, washing machines, dishwashers and other kitchen appliances that do not contain toxic substances or faecal matter

Gross Floor Area means:

(a) in relation to a BUILDING – the total floor area (length times width) of all STOREYS
(b) in relation to a STOREY - the area (length times width) of all floors measured over the enclosing walls (if any) including the MEZZANINE, INTERIOR WALLS, partitions, cupboards, and other built-in furniture, fixture or fitting
(c) in relation to a room - the area (length times width) measured within the finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting
(d) in relation to a FIRE COMPARTMENT – the total area (length times width) of all floors in the finished surfaces of the bounding construction of the FIRE COMPARTMENT or within areas having a use contributing to the FIRE LOAD

(e) in relation to an ATRIUM – the total area (length times width) of all floors within the ATRIUM measured within the bounding construction or EXTERNAL WALLS

Groundwater water naturally stored or flowing beneath the surface of the ground

Growing Substrate substance through which plant roots grow and extract water and nutrients on a GREEN ROOF, which may include peat, humus, wood chips, sand, lava, or expanded clay

Gutter a shallow trough fixed beneath the edge of a roof for carrying off rainwater

HVAC System a mechanical, electrical, or other system for modifying air temperature, humidity, ventilation, or doing all of these things, in a space within a BUILDING

Habitable a BUILDING or room used for typical domestic activities, which:

(a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room and sunroom
(b) excludes a BATHROOM, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photo darkroom, clothes-drying room, and other spaces of a specialised nature not frequently occupied

Handrail a rail to provide support to, or assist with the movement of a person

Hazard/Hazardous anything with an unreasonable risk of bodily injury or deterioration of health, or causes a DISASTER

Hazardous Substances means, unless expressly provided otherwise by regulations, any substance:

(a) with one or more of the following intrinsic properties:
    (i) explosiveness
    (ii) flammability
    (iii) a capacity to oxidise
    (iv) corrosiveness
    (v) toxicity (including chronic toxicity)
    (vi) ecotoxicity, with or without bio-accumulation, or

(b) which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any one or more of the properties specified above

Heat Flux the amount of heat transferred per unit area per unit time from or to a surface, measured in kW/m2

Height vertical distance between the floor of the lowest occupied space above the ground and the top of the highest occupied floor, but not including spaces located within or on the roof that enclose stairways, lift SHAFTS or machinery rooms

Horizontal Exit - see EXIT

Hydrant - see FIRE SAFETY SYSTEM

Impervious that which does not allow the passage of moisture

Insulation material installed next to walls, ceilings, floors and roofs to prevent heat, electricity, or sound from passing into or out of a room or structure. In relation to FRL, INSULATION is the ability to maintain a temperature on a surface below limits specified in AS 1530.4

Interior Wall - see wall

IPX - see Electrical

Large-Isolated Building a BUILDING of any BUILDING FUNCTION that is four STOREYS or greater in HEIGHT and/or exceeds a GROSS FLOOR AREA of 8,000 m^2 on the ground floor, and is sited more than 25 m from an adjacent BUILDING or property

Lifespan the duration of a BUILDING, FACILITY or SITE from construction to demolition

Lightweight Construction having no FIRE-RESISTANT LEVEL, or using lightweight prefabricated materials such as:

(a) sheet or board material, plaster, render, sprayed application, or other material similarly susceptible to damage by impact, pressure or abrasion; or

g(b) concrete and concrete products containing pumice, perlite, vermiculite, or other soft material similarly susceptible to damage by impact, pressure or abrasion; or

(c) masonry having a thickness less than 70 mm

Live - see Electrical

Live Load the weight of everything temporarily adding load to a structure, such as people or goods in/on a BUILDING, STOREY or ROOM, but not including anything permanently attached to it

Load-Bearing intended to resist forces and moments additional to those due to its own weight

Low Voltage / LV - see Electrical

Main Switch - see Electrical

Main Switchboard - see Electrical

Major Hazard Facility a BUILDING, FACILITY or SITE that has a high likelihood of posing harm to people or property due to the storage, use, dispensing or handling of HAZARDOUS SUBSTANCES

Manual Fire Alarm Box - see FIRE SAFETY SYSTEM

Mezzanine an intermediate floor within a room which is not more than 1/3 of the floor area of the room or 200 m^2, whichever is the lesser

Natural Disaster a DISASTER resulting from a force of nature such as from a cyclone, tsunami, earthquake, landslip or bushfire

Non-Combustible a BUILDING MATERIAL or finish that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapours, when subjected to fire or heat. Materials that pass AS 1530.1 Combustibility Tests for Materials and/or ASTM E 136 are considered to be NON-COMBUSTIBLE

Occupancy Permit a document issued by the Government of Samoa certifying that a BUILDING, FACILITY and/or SITE is safe for habitation and use according to any attached conditions in the permit

On-Site Wastewater Management collection, storage, treatment and disposal of WASTEWATER from a BUILDING or FACILITY on the same property as it is generated

Outfall the DISCHARGE AREA of WASTEWATER or STORMWATER system

Overcurrent - see Electrical

Peer Review an independent and objective technical review of the design of a BUILDING or structure conducted by a PROFESSIONAL CONSULTANT who has a level of experience in the design of similar projects and is at least comparable in experience to that of the PROFESSIONAL CONSULTANT responsible for the project

Protected Extra-Low Voltage (PELV) - see Electrical

Performance Requirement a provision in the NBC that describes the level of performance that a BUILDING, FACILITY, SITEWORK, BUILDING ELEMENT, BUILDING MATERIAL, SITE SERVICING, or the like must have to comply with the NBC

Person with a Disability a person who has an impairment or a combination of impairments that limits the extent to which the person can engage in activities, pursuits and processes of everyday life, including, without limitation a physical, sensory, neurological or intellectual impairment, and/or a mental illness

Piping Junction a sanitary fitting used to connect one or more branch pipes or channels to a main pipe or channel. A square

Pitch maximum angle to the horizontal of a line connecting the nosings of stair treads in a single straight flight of a stairway, or measuring the angle of a roof

Place of Safety a location that is not under threat from harmful effects of a fire or DISASTER that people can congregate in after escaping the effects of an emergency, including:

(a) a designated location in a BUILDING, FACILITY, or SITE connected to an EVACUATION ROUTE
(b) a road or adjacent property not under threat
(c) a location on SITE not under threat that is connected to a road or other means of safely leaving the SITE

Plumbing the system of pipes, tanks, fittings, and other apparatus required for POTABLE water supply, WASTEWATER removal and/or treatment, and ventilation / heating or cooling in a BUILDING, FACILITY or SITE

Portable Fire Extinguisher - see FIRE SAFETY SYSTEM

Private Garage an enclosure intended for the storage of up to 3 cars for a **Residential Building** or UNIT

Product Information Sheet a written statement by a manufacturer or other authorised expert or organisation describing and verifying a product's characteristics

Professional Consultant a person with appropriate experience in a field specified in the BUILDING REGULATIONS, being:

(a) a registered professional in the relevant discipline, or
(b) a Corporate Member of a recognised professional institution

Protective Earthing Conductor see Electrical

Public Corridor an enclosed corridor, hallway or the like which:

(a) serves as a means of egress from 2 or more UNITS to an EXIT from the STOREY, or
(b) is required to be provided as a means of egress from any part of a STOREY to an EXIT

Quality Assurance an inspection by an APPROVAL AUTHORITY or a PEER REVIEW of the construction of a BUILDING, FACILITY, SITEWORK or SITE SERVICING to verify general conformance with the construction documents, applicable performance code and approved regulations and standards

R-Value ability of a BUILDING MATERIAL, BUILDING ELEMENT or AIR SPACE to reflect solar heat gain, with a high value indicating increased resistance to heat gain

Radiant Flux minimum radiant energy needed to sustain flame propagation for floor coverings in kW/m^2

Refrigeration Room a sealed and ventilated room (constructed or pre-fabricated) that maintains a low temperature and is typically used to chill or freeze food stuffs

Refrigerant chemical used in a cooling mechanism, such as an air conditioner or refrigerator, as the heat carrier which changes from gas to liquid and the back to gas in the refrigeration cycle

Registered Testing Authority an APPROVAL AUTHORITY recognised and acceptable to the Government of Samoa, including those registered by the National Association of Testing Authorities (NATA) to test in the relevant field, and/or listed below:

(a) National Building Technology Centre
PO Box 30, Chatswood NSW 2067, AUSTRALIA

(b) Commonwealth Scientific and Industrial Research Organisation; Division of Building Research
PO Box 56, Highett VIC 3190, AUSTRALIA

(c) Building Research Association of New Zealand
Private Bag
Porirua, NEW ZEALAND

(d) Testing laboratories registered by the Testing Laboratory Registration Council (TELARC) of New Zealand to test in the relevant field

(e) Fire Insurers Research and Testing Organisation
Melrose Avenue
Borehamwood, LONDON (UK)

(f) National Institute of Standards and Technology
Gaithersburg, MD20899, USA

(g) Underwriters Laboratories Incorporated
333 Plingsten Road
Northbrook, IL 60062, USA

(h) National Research Council, Division of Building Research
75 Boul De Mortagne
Boucherville, Quebec, CANADA

(i) Public Works Research Institute, Ministry of Construction
Tsukaba Science City
Ibaraki - Ken, 305 JAPAN

(j) Scientific Research Organisation of Samoa (SROS)
Nafanua, Apia, Samoa, P.O Box 6597, enquiries@sros.org.ws

Renewable Energy is energy derived from any of the following sources: solar, wind, geothermal, BIO-ENERGY, hydroelectric, tidal, geothermal, hydrogen, FUEL CELLS, or other form of energy deemed appropriate by the Government of Samoa

Renewable-Ready a BUILDING, FACILITY, or SITE containing the appropriate infrastructure and facilities to allow a RENEWABLE ENERGY source to be easily installed

Required Accessible Building functional use of a BUILDING, FACILITY and/or SITE for all people, including a PERSON WITH A DISABILITY

Residual Current Device (RCD) - see Electrical

Resistance to the Incipient Spread of Fire the ability of a ceiling membrane to insulate the space between the ceiling and roof, or ceiling and floor above, and limit the temperature rise of COMBUSTIBLE substances in this space during the STANDARD FIRE TEST to 180ºC

Reticulated owned and operated by the Government of Samoa

Reticulated Stormwater System pipes that are entirely owned and operated by the Government of Samoa that collect, store and convey RUNOFF from a SITE to an OUTFALL

Reticulated Wastewater System pipes that are entirely owned and operated by the Government of Samoa that collect and convey WASTEWATER

Reticulated Water Supply pressurised pipes that are entirely owned and operated by the Government of Samoa containing POTABLE water

Riser Main - see FIRE SAFETY SYSTEM

Road Reserve land owned by the Government of Samoa containing facilities for the safe movement of vehicles and people (of all abilities), and may contain RETICULATED STORMWATER, WASTEWATER and WATER SUPPLY SYSTEMS, utilities, transit facilities, DRAINAGE DITCHES and OUTFALLS.

Rooflight a skylight, window, or the like, installed in a roof to permit natural light to enter the room below

Runoff amount of rainfall that does not percolate into soil and becomes perched on the ground-surface

Safety Glass glass that has been toughened, laminated or had a safety film applied to it so that it resists shattering upon impact, is certified by an APPROVAL AUTHORITY acceptable to the Government of Samoa, and bears identification markings indicating that the pane has been cut from SAFETY GLASS material.

Sanitary Compartment a room or space containing a TOILET, closet pan, soil pan, chemical TOILET, or the like

Sanitary Fixture any receptacle or apparatus that receives clean, POTABLE water and is used for domestic cleansing, including sinks, showers, bathtubs, hot tubs, laundry tubs and associated taps, stoppers and overflow mechanisms, and accessories such as towel racks, AUTOMATIC hand dryers, soap dispensers, etc.

Sarking-Type Material a material such as a reflective foil or other flexible membrane of a type normally used for a purpose such as water-proofing, vapour proofing or thermal reflectance

Seawall a wall or embankment constructed to prevent the sea encroaching on or eroding an area of land

Self-closing applied to a door or window means equipped with a devise which returns the door or window to the fully closed and latched position immediately after each manual opening

Separated Extra-Low Voltage (SELV) - see Electrical

Septage liquid, solid and semi-solid material that results from WASTEWATER pre-treatment in a septic tank, which is removed from the system by pump-out/DESLUDGING operations

Setback distance from a curb, property line, BUILDING, or natural features such as a riverbank within which development restrictions are imposed

Shaft walls that create an enclosure, bounding:

(a) a well, other than an ATRIUM, or
(b) vertical chute, duct or similar passage for ventilation, pipes, electrical CABLE, and the like, but not a chimney or flue intended for hot products of combustion
(c) a lift or stairway

Site - see definition on page A-3

Sitework - see definition on page A-3

Site Servicing - see definition on page A-3

Slip-resistant surface treated by chemical or physical means so that friction is created when stepped on

Sludge semi-liquid solids settled from WASTEWATER

Smoke Alarm - see FIRE SAFETY SYSTEM

Smoke Control System - see FIRE SAFETY SYSTEM

Smoke Detector - see FIRE SAFETY SYSTEM

Smoke-Developed Index the index number for smoke developed under AS 1530.3

Smoke Door a SELF-CLOSING, ACCESSIBLE door that prevents that passage of smoke and/or airborne toxins from one side of the doorway to the other

Smoke Lobby a room constructed in an EVACUATION ROUTE that assists in the SMOKE CONTROL SYSTEM

Smoke-proof designed to restrict the spread of smoke through a BUILDING or FACILITY, and/or impermeable to smoke

Soakpit an area constructed of course aggregate, stones, or similar, below ground level to collect STORMWATER and RUNOFF

Specified Systems specific features or components of a BUILDING or FACILITY for which on-going regulatory control is required for proper maintenance as detailed in the BUILDING REGULATIONS, including the following:

(a) COMPLIANT SPRINKLER SYSTEM
(b) dry and wet fire extinguishing systems
(c) AUTOMATIC or manual emergency warning systems for fire or other HAZARDS
(d) manual and AUTOMATIC FIRE ALARMS, smoke / heat detectors, gas and radiation systems
(e) SMOKE CONTROL SYSTEM (mechanical and natural)
(f) AUTOMATIC gas leak detection systems for COMBUSTIBLE gases
(g) emergency power systems
(h) intercom voice system to facilitate warning and evacuation
(i) electromagnetic or AUTOMATIC doors (sliding or revolving), windows, and access controlled doors
(j) FIRE DOORS, SMOKE DOORS, FIRE WINDOWS and FIRE SHUTTERS
(k) emergency lighting systems
(l) EVACUATION ROUTE pressurisation system and signage
(m) RISER MAINS for use by EMERGENCY RESPONDERS
(n) automatic back-flow preventers connected to a potable water supply
(o) lifts, escalators, travelators, moving walks or other systems for moving people or goods
(p) mechanical ventilation or air conditioning systems
(q) all devices providing access to the BUILDING interior
(r) audio loops or other assistive listening systems
(s) FM radio frequency systems and infrared beam transmission
(t) cable cars used for emergencies

Spread-of-Flame Index the index number for spread of flame under AS 1530.3

Standard Fire Test the FIRE-RESISTANCE test of BUILDINGS, FACILITIES and BUILDING ELEMENTS under AS 1530.4

Storey a space within a BUILDING situated between one floor level and the ceiling or roof next above, but not:

(a) a space that contains one, some or all of the following:

(i) a lift SHAFT stairway or meter room

(ii) a BATHROOM, shower room, water closet, or other SANITARY COMPARTMENT, or

(iii) a PRIVATE GARAGE

(iv) heating, ventilating or lift equipment, water tanks or similar equipment at the top of the BUILDING, or

(b) a MEZZANINE, unless:

(i) the GROSS FLOOR AREA is >200 m^2 or > 1/3 of the floor area of the room, whichever is less

(ii) two or more MEZZANINES at or near the same level have an aggregate GROSS FLOOR AREA >200 m^2 or > 1/3 of the floor area of the room, whichever is less, or

(c) a space partly below the finished ground and the underside of the ceiling is <1m above the average finished level of the ground at the EXTERNAL WALL, or if the EXTERNAL WALL is >12 m long, the average for the 12 m part where the ground is lowest

NOTE: a STOREY 6 m in HEIGHT or greater will be counted as 2 STOREYS unless it is the only STOREY above ground

Storm Surge - see FLOOD

Stormwater Management use of mechanical equipment and/or natural means to manage SURFACE WATER and RUNOFF resulting from rainfall, storms or other forms of precipitation, and provide for a controlled release

Structural Adequacy - see FIRE RESISTANCE LEVEL

Stucco a wall CLADDING formed from reinforced solid plaster over a rigid or non-rigid backing

Stud an upright support in the wall of a BUILDING or FACILITY to which sheathing, drywall, etc. are attached

Surface Water all naturally occurring water, other than GROUNDWATER, on the surface of the ground

Sustainable / Sustainable Development DEVELOPMENT occurring at a rate and in such a way as to ensure the quality of the environment and supply of resources is maintained and, wherever practicable, enhanced to meet the needs of the present generation without compromising the needs of future generations

Switchboard - see Electrical

Tall Building a BUILDING greater than 4 STOREYS in HEIGHT

Thermal Performance ability of a BUILDING to manage the flow of heat, air and moisture to benefit the sustainability of the structure, occupants and the environment

Toilet mechanism for the collection and conveyance of human waste (urine and faeces), and sometimes treatment of human waste as in a composting TOILET

Trade Waste water-borne waste from business, trade or manufacturing process containing predominantly non-human waste and/or contaminated water

U-value thermal resistance of a BUILDING MATERIAL or BUILDING ELEMENT, with a lower value indicating better resistance to transfer of heat

Unit a room, rooms, portion of a BUILDING, or a whole BUILDING used by one or joint occupants, lessees, and/or tenants to the exclusion of any others

Verification Method a test, inspection, calculation or other method that determines whether a BUILDING, BUILDING ELEMENT, FACILITY, SITEWORK and/or SITE SERVICING complies with relevant PERFORMANCE REQUIREMENTS acceptable to the Government of Samoa

Wall any of the following types used to construct a BUILDING or FACILITY:

(a) **Common Wall** - wall shared by adjoining BUILDINGS or UNITS

(b) **Curtain Wall** - non load-bearing, thin, EXTERNAL WALL (typically consisting of an aluminium frame with glass, metal or stone panels) in which the frame transfers wind and gravity loads to the BUILDING, typically at the floor

(c) **External Wall** - outer wall of a BUILDING which is not a COMMON WALL

(d) **Fire Wall** a wall with an appropriate FIRE RESISTANCE LEVEL that divides a STOREY or BUILDING into FIRE COMPARTMENTS

(e) **Interior Wall** a non load-bearing wall entirely within the structure's interior

(f) **Load-Bearing Wall** - an EXTERNAL WALL or INTERIOR WALL that resists forces in addition to those due to its own weight

Wastewater water-borne human waste from kitchens, showers, baths, domestic laundries, SANITARY COMPARTMENTS, etc., but does not include SURFACE WATER, STORMWATER, GROUNDWATER or TRADE WASTE

Waterproof / Waterproofing the complete and total resistance of a BUILDING ELEMENT or material to the ingress of moisture

Water resistant a BUILDING ELEMENT or BUILDING MATERIAL that restricts moisture movement and will not degrade under conditions of moisture

Water table level of GROUNDWATER in soil and rock, below which the ground is saturated

Weathertight the resistance of a BUILDING to the weather where water and wind are prevented from entering and accumulating behind the CLADDING in amounts that can cause undue dampness or damage to the BUILDING

Wet Area an area within a BUILDING having water supplied from a WATER SUPPLY SYSTEM which includes BATHROOMS, showers, laundries and SANITARY COMPARTMENTS and excludes kitchens, bar areas, kitchenettes or domestic food and beverage preparation areas

Wiring - see Electrical

Wiring Enclosure - see Electrical

A4 Abbreviations

ACRONYMS

ABS Acrylonitrile-Butadiene-Styrene, a pipe material
ADF Average Daylight Factor
AS Australian Standards

BCA Building Code of Australia
BS British Standards

CCANZ Cement and Concrete Association of New Zealand
CCID Chemical Classification and Information

DFL` Design Flood Level

EEL Environmental Exposure Limit
EIFS Exterior Insulation and Finish System
EMI Electromagnetic Interference
EN European Standards
EPD Enviromental Product Declaration
EPDM ethylene propylene diene terpolymer, a synthetic rubber roofing material
ESA Exposed Surface Area

FFL Finish Floor Level
FRL Fire Resistance Level

GEMS Greenhouse and Energy Minimum Standards
GHG Greeenhouse Gas
GHS Globally Harmonised System of Classification and Stabilisation of Chemicals
GRP Glass Reinforced Plastics
GWDD Greywater Diversion Device

HDPE High Density Polyethylene
HSMP Hazardous Substances Management Plan
HSNO Hazardous Substances and New Organisms

ICU Insulated Glass Unit
IDF Inflow Design Flood
IGU Insulated Glass Unit
ILCOS International Lamp Loading Systems
IPX Ingress Protection Rating
IR Infrared
IRC International Residential Code

LDPE Low Density Polyethylene
LHL Low-High-Low
LP Liquid Petroleum
LV Low Voltage

MEN Multiple Earth Neutral
MEPS Minimum Energy Performance Standards
MERV Minimum Efficiency Reporting Value
MHF Major Hazard Facility
MIMS Mineral Insulated Metal Sheathed
MSDS Material Safety Data Sheet
MU Multiple Unit

NBC National Building Code of Samoa
NESAQ National Environmental Standards for Air Quality
NZECP New Zealand Electrical Code of Practice
NZS New Zealand Standard

NZIOC New Zealand Laboratory of Chemicals
OSB Oriented Strand Board
PCB Polychlorinated biphenyl
PE Polyethylene
PELV Protected Extra-Low Voltage
pH acidity or alkalinity of a substance
PVC Polyvinyl chloride

RCD Residential Current Device
RECP Rolled Erosion Control Products
RFI Radio Frequency Interference
RPL Recycled Plastic Lumber
RRR Reduce, Re-Use, Recycle

SELV Separated Extra-Low Voltage
SHGC Solar Heat Grain Coefficient
SLS Serviceability Limit State
SMOGRA Smoke Growth Rate Index
SPD Spillway Design Flood
SPD Standard Proctor Density
SPUF Sprayed Polyurethane Foam

TEL Total Exposure Limit
TS Technical Specification

ULS Ultimate Limit State
uPVC Unplasticised Polyvinyl Chloride

VOC Volatile organic compound

WELS Water Efficiency Label Standard
WES Workplace Exposure Limit

ZSp Zone Factor / Structural Performance Factor

GOVERNMENT OF SAMOA DEPARTMENTS AND AGENCIES

DMO Disaster Management Office
EPC Electric Power Corporation
LTA Land Transport Authority
MESC Ministry Of Education, Sport & Culture
MNRE Ministry Of Nature Resources and Environment
MOH Ministry Of Health
MWTI Ministry Of Works & Transport Infrastructure
NHS National Health Services
PUMA Planning and Urban Management Agency
SHC Samoa Housing Corporation
SFESA Samoa Fire And Emergency Services Authority
SWA Samoa Water Authority

INTERNATIONAL AGENCIES

ABCB	Australian Building Code Board
AIRAH	Australian Institute of Refrigeration, Air Conditioning and Heating
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating, and Air conditioning Engineers
ASSE	American Society of Safety Engineers
ASTM	American Section for the International Association for Testing Materials
BEES	Building for Environmental and Economic Sustainability
BRANZ	Burns Registry of Australia and New Zealand
BREEAM	Building Research Establishment Environmental Assessment Method
CCANZ	Concrete and Cement Association of New Zealand
CEMARS	Certified Emissions Measurement and Reduction Scheme
CIBSE	Chartered Institution of Building Services Engineers
FSC	Forest Stewardship Council
IBCO	International Building Code Organisation
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IRHACE	Institute of Refrigeration, Heating and Air Conditioning Engineers
ISO	International Organization for Standardisation
NABERS	National Australian Built Environment Rating System
NATA	National Association of Testing Authorities
NFPA	National Fire Protection Agency
NHMRC	National Health and Medical Research Council
NZEPA	New Zealand Environmental Protection Authority
NZDAA	New Zealand Demolition & Asbestos Association
NZGBC	New Zealand Green Building Council
NZSGA	New Zealand Safety Glass Association
SAA	Standards Association of Australia
TELARC	Testing Laboratory Registration Council
UNESCO	United Nations Educational Scientific and Cultural Organisation
WBCSD	World Business Council for Sustainable Development
WSA	Website Standards Association
WSAA	Water Services Association of Australia

A5 Compliance

.1 Demonstration of Performance

All applications for a BUILDING PERMIT must have plans and specifications demonstrating that PERFORMANCE REQUIREMENTS of the NBC have been achieved to the satisfaction of APPROVAL AUTHORITIES in Samoa.

.2 Complying with Performance Requirements

For BUILDING PERMIT approval, compliance with PERFORMANCE REQUIREMENTS can only be achieved by:

(a) complying with DEEMED-TO-SATISFY PROVISIONS by:

(i) notating the appropriate ACCEPTABLE SOLUTION and demonstrating how it is implemented in the proposed DEVELOPMENT

(ii) demonstrating in plans, specifications or other suitable documents how the DEEMED-TO-SATISFY PROVISIONS are implemented in the design solution, and/or

(iii) listing appropriate legislation, regulation or standards acceptable to the Government of Samoa and demonstrating how they are implemented in the proposed DEVELOPMENT

(b) presenting an ALTERNATIVE SOLUTION which:

(i) complies with the PERFORMANCE REQUIREMENTS, or

(ii) is shown to be at least equivalent to the DEEMED-TO-SATISFY PROVISIONS

Where DEEMED-TO-SATISFY PROVISIONS, ACCEPTABLE SOLUTIONS and/or ALTERNATIVE SOLUTIONS are compliant with different components of a PERFORMANCE REQUIREMENT, each one must be specifically notated.

.3 Alternative Solutions

An ALTERNATIVE SOLUTION only complies with the NBC if appropriate assessment methods, satisfactory to the Government of Samoa, are used. The following assessment methods, or any combination of them, can be used to determine if a proposed DEVELOPMENT complies with PERFORMANCE REQUIREMENTS:

(a) supporting evidence (expert opinion) that the use of a BUILDING MATERIAL, form of construction, or design meets a PERFORMANCE REQUIREMENT or a DEEMED-TO-SATISFY PROVISION as described in A4.5 Suitability of Materials and A4.6 Evidence of Suitability (b)

(b) VERIFICATION METHOD acceptable to the Government of Samoa that is a test, inspection, calculation or other method verifying that a BUILDING, BUILDING ELEMENT, BUILDING MATERIAL, ASSEMBLY, FACILITY, SITEWORK, SITE SERVICING or structure complies with relevant PERFORMANCE REQUIREMENTS

(c) satisfactory comparison with DEEMED-TO-SATISFY PROVISIONS

When submitting ALTERNATIVE SOLUTIONS for consideration by the Government of Samoa, the submittal must:

(a) identify the relevant DEEMED-TO-SATISFY PROVISION relevant to the ALTERNATIVE SOLUTION

(b) identify the PERFORMANCE REQUIREMENTS relevant to the identified DEEMED-TO-SATISFY PROVISIONS

(c) describe the method, process, fabrication, construction, testing or documentation of the expected results of the ALTERNATIVE SOLUTION

.4 Suitability Of Building Materials

Every part of a BUILDING, FACILITY, SITEWORK, SITE SERVICING and amenities on SITE must be constructed in a manner which will achieve the required level of performance, using BUILDING MATERIALS and methods that are not faulty or unsuitable for the purpose for which they are intended.

.5 Evidence of suitability

Evidence to support the use of a BUILDING MATERIAL, BUILDING ELEMENTS, ASSEMBLY, method, form of construction or other mechanism must be any, some or all of the following methods:

(a) a report issued by a REGISTERED TESTING AUTHORITY, showing that the BUILDING MATERIAL, method or form of construction has been submitted to the tests listed in the NBC or ACCEPTABLE SOLUTIONS, and that the results of those tests and any other relevant information demonstrate its suitability for use in the development

(b) a current CERTIFICATE OF ACCREDITATION from an appropriately qualified PROFESSIONAL CONSULTANT OR APPROVAL AUTHORITY which:
   (i) certifies that a BUILDING MATERIAL, method or form of construction complies with requirements of the NBC
   (ii) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon

(d) PRODUCT INFORMATION SHEETS listing characteristics in compliance with PERFORMANCE REQUIREMENTS and/or DEEMED-TO-SATISFY PROVISIONS

(e) certificates issued by the Standards Association of Australia or the Standards Association of New Zealand accompanied by a report outlining compliance with PERFORMANCE REQUIREMENTS in the NBC

(f) a description of ALTERNATE SOLUTIONS that achieve the PERFORMANCE STANDARDS as per Section A5.4 above

(g) any other form of documentary evidence that correctly describes the properties and performance of the material, method or form of construction and adequately demonstrates its suitability for use in the BUILDING acceptable to the Government of Samoa

All evidence submitted must be original copies and must comply with the BUILDING REGULATIONS.

.6 Building Permit Application Requirements

BUILDING PERMIT applications (including plans, documents, specifications) will be deemed to be complete when provisions in Section A5.1 to A5.6 are adequately addressed and the following is supplied:

(a) plans are stamped by a qualified PROFESSIONAL CONSULTANT for all disciplines (eg. architectural, electrical, structural, mechanical) where deemed appropriate for the DEVELOPMENT (as determined by the Government of Samoa) with notation on the plans that the PROFESSIONAL CONSULTANT certifies that PERFORMANCE STANDARDS in the NBC have been achieved

(b) list of applicable DEEMED-TO-SATISFY PROVISIONS achieved

(c) list of ACCEPTABLE SOLUTIONS used

(d) list of VERIFICATION METHODS achieved

(e) list of ALTERNATE SOLUTIONS used and the PERFORMANCE REQUIREMENTS satisfied as a result of their use

(f) list and submittal of PRODUCT INFORMATION SHEETS and the PERFORMANCE REQUIREMENTS satisfied as a result of their use

(g) list and submittal of CERTIFICATES OF ACCREDITATION

(h) approval granted from government agencies (eg. SFESA, SWA, PUMA, LTA)

Further information on the applicability and appropriateness of professional certification and procedures for the submission of certificates, reports or other documentation to Approval authorities as evidence of compliance can be found in the BUILDING REGULATIONS and publications issued by the Government of Samoa.

.7 Compliance with International Standards

A number of International Standards, including ACCEPTABLE SOLUTIONS, specifications, guidelines, policy documents and instructional manuals, are referenced in the NBC and listed as appropriate sources from which to design a solution that will comply with the NBC. These standards are listed at the end of each section in the NBC. A complete list of International Standards used throughout the NBC is included in Appendix A.

Section B

Stability

Contents

Section B

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
B1 Structure																
B1.A	Loads	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B1.B	Foundations and Waterproofing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B1.C	Building Lifespan	•	•	•					•	•				•		
B1.D	External Concrete Panel	•	•	•			•		•	•	•	•	•	•		•
B1.E	Lightweight Construction	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B2 Sitework																
B2.A	Construction Safety	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B2.B	Slope Stability, Erosion and Sedimentation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B2.C	Groundwater and Saturated Soil	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B2.D	Stormwater Management	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B2.E	Roof Drainage System	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B3 Unstable Buildings and Demolition																
B3.A	Unstable Buildings	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B3.B	Termites	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B3.C	Demolition	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B4 Building Materials																
B4.A	Durability Standards for Building Materials	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B5 Glazing and Windows - Structure and Safety																
B5.A	Materials and Structural Integrity	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B5.B	Human Impact Safety	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B5.C	Glazing for Fall Protection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

B STABILITY

SECTION B OBJECTIVES

B(i)

The design, construction and operation of BUILDINGS, FACILITIES, SITEWORK, SITE SERVICING and activities on SITE must:

(a) safeguard people from injury and loss of amenity caused by structural failure, structural behaviour, and the consequences of DISASTERS

(b) not cause harm or physical damage to other property from structural failure or structural behaviour

B(ii)

Procedures and methods of demolition must be adequate to prevent death and injury to persons and avoid damage to adjacent property.

B1 Structure

REQUIRED PERFORMANCE

.1 BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING must be designed and constructed to prevent structural failure during the expected LIFESPAN of the BUILDING.

.2 BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING must have a low probability of causing loss of amenity or compromise to safety and SERVICEABILITY throughout their LIFESPAN due to deformation, vibratory resonance, degradation, or other physical characteristics resulting from:

(a) loads, dynamic responses and internal actions

(b) the properties of the materials used in the BUILDING

(c) the foundation conditions

(d) the intended use of the BUILDING, FACILITY or SITE

(e) effects of uncertainties resulting from construction activities, or the sequence in which construction occurs

.3 Design and construction must take into account the physical conditions likely to affect the stability of BUILDINGS, BUILDING ELEMENTS, FACILITIES, SITEWORK and SITE SERVICING, including:

(a) self weight (DEAD LOAD) and imposed loads (LIVE LOAD)
(b) temperature and wind
(c) earth pressure (soil and hydrostatic pressure)
(d) water (surface, GROUNDWATER and precipitation)
(e) DISASTERS (earthquake, tsunami, cyclones, FLOODING, landslips)
(f) fire, impact and explosion
(g) reversing or fluctuating elements
(h) differential movement
(i) vegetation and biological factors such as termites
(j) proximity to other BUILDINGS
(k) equipment, non-structural elements and contents
(l) time dependent effects including creep and shrinkage
(m) removal of support
(n) erosion (coastal, river, land)

.4 Foundations must be appropriately sized, reinforced and drained to promote STABILITY of the BUILDING, FACILITY, and/or SITE, and must be protected from water infiltration and hydrostatic pressure due to a high WATER TABLE, including potential, current and future fluctuations unless the BUILDING, FACILITY or SITE SERVICING is specifically designed for this to occur.

.5 BUILDINGS, FACILITIES AND SITES must be designed to safely convey SURFACE WATER RUNOFF to an appropriate OUTFALL, with the following objectives:

(a) safely retain stormwater on site as long as possible following a storm event

(b) ensure STORMWATER does not compromise the structural capability of BUILDINGS and FACILITIES

.6 BUILDINGS and FACILITIES must achieve DURABILITY goals according to BUILDING GROUP, as shown in Table B1.6.

Table B1.6: Durability Goal for Building Groups

Building Group	Description	Structures	Durability Goal
1	BUILDINGS, FACILITIES or **Major Infrastructure** whose function serves a large area or large number of people in Samoa	• **Major Infrastructure**, including hydroelectric dams and other dams whose failure would result in loss of human life, SEAWALLS, ports, bridges and tunnels • Extremely HAZARDOUS facilities adjacent to large populations • BUILDINGS having critical national defence functions • power generating stations, solar installations and other utilities required for emergency backup • aviation control towers, air traffic control centres, and emergency aircraft hangars • water treatment facilities required to maintain water pressure for fire suppression and/or supply drinking water	50 years
2	BUILDINGS and FACILITIES that are essential to post-DISASTER recovery or the primary function is storage or handling of HAZARDOUS SUBSTANCES BUILDINGS with activities that affect large groups of people in a village	• hospitals and other **Health-Care Buildings** having surgery or emergency treatment facilities • fire, rescue and police stations, and emergency vehicle garages • BUILDINGS used as emergency shelters • BUILDINGS used for communication and operation centres in an emergency, and other facilities for emergency response • BUILDINGS in which the use, storage or handling of HAZARDOUS SUBSTANCES capable of causing acutely HAZARDOUS conditions that extend beyond property boundaries • **Tourist Accommodation** (a BUILDING with more than 8 guest rooms) • accommodation for the aged, disabled, disadvantaged or children (greater than 250 m^2) • **School** with more than 30 students, including classrooms, laboratories, gymnasiums, halls and ablutions	50 years
3	BUILDINGS which may house groups of people, vulnerable populations, or fulfil a role of importance to the community or village	• **Communal Residential Buildings** (greater than 350 m^2) • **Multiple Unit Residential Building** (with more than 4 UNITS) • **Assembly Buildings** (greater than 150 m^2) • **Tourist Accommodation** (a BUILDING with 1-8 guest rooms) • **Aged-Care Building** accommodation for disabled and/or the elderly (250 m^2 or less) • **Office** / **Commercial** (greater than 350 m^2) • **Mixed Use Buildings** (greater than 350 m^2) • **Industrial** / **Storage Buildings** (greater than 350 m^2) • **Heritage Buildings**	25 years
4	BUILDINGS which accommodate a low number of people, or with a low replacement cost	• **Communal Residential Building** (350 m^2 or less) • **Multiple Unit Residential Building** (4 UNITS or less) • **Assembly Buildings** (150 m^2 or less) • **Fale Tourist Accommodation** (other than **Open Fales** which are not subject to the NBC) • **Retail** and kiosk-type shop (50 m^2 or less) • **Office** / **Commercial** (350 m^2 or less) • **Mixed Use Building** (350 m^2 or less) • **Industrial** / **Storage Buildings** (350 m^2 or less) • **Minor** and **Temporary Structures** • **School** housing two classrooms or less	15 years
5	Samoan **Fales** and **Single Unit Residential**	• **Open Fale (faleo'o)** - BUILDING PERMIT not required • **Regulated Fale** • **Single Unit Residential**	not specified

DEEMED-TO-SATISFY PROVISIONS

B1.A Loads

.1 BUILDINGS and FACILITIES must be capable of resisting the following loads:

(a) **wind loads**
must comply with AS/NZS 1170 (known as SAA Loading Code)

Part 2 - Wind loads
When using Part 2 of the Standard a basic wind speed for ultimate strengths limit state of 70 m/s to all areas. The equivalent basic wind speed for permissible stress methods of design is 57 m/s. When the simplified procedure of AS 1170 part 2 is followed, the value of factor B, to be applied is 2.3. The maps of Australia in the Standard are to be disregarded.

(b) **DEAD LOADS** (self-weight), **LIVE LOADS** (people and goods) and **earthquake loads**:
must comply with NZS 4203 Part 1, 2, 3 and 4 - General structural design and design loadings for BUILDINGS.
The maps of New Zealand shown in the above Standard are to be disregarded. All of Samoa is considered to be in zone 7 and the corresponding zone factor of 1.05 for use with NZS 4203 together with a structural performance factor of 0.67 provides a ZS_p factor of 0.7.

(c) **DISASTER loads** *from cylonic winds, seismic loads, tsunami / FLOODING loads, landslips)*
must comply with AS/NZS 1170 (known as SAA Loading Code)

(d) **other loads** based on principles of structural mechanics using a rational method to achieve the following objectives:
(i) equilibrium
(ii) stability
(iii) geometric compatibility

.2 In addition to the methods listed in B1.A.1 above, the following methods may be used to calculate structural STABILITY:

(a) load calculation software acceptable to the Government of Samoa resulting in a demonstration of STRUCTURAL ADEQUACY and the ability to safely resist the required loads

(b) full-scale testing of STRUCTURAL ADEQUACY of a BUILDING, FACILITY or other structure indicating that it can safely resist the loads required by the NBC

.3 In the case of **Mixed Use Buildings,** the highest (or most stringent) load requirement associated with Building Function identified in Section A1 must be assigned to the entire structure unless the uses are structurally separated.

.4 Structural STABILITY may be required to be proven on-site during construction by an engineering assessment conducted by a PROFESSIONAL CONSULTANT and/or APPROVAL AUTHORITY, and/or an in situ load test where there is reasonable doubt as to the STABILITY or load-bearing capacity of a partially completed or completed BUILDING, FACILITY, SITEWORKS, **Major Infrastructure**, **Minor Structure** or **Temporary Structure**.

.5 BUILDING MATERIALS, ASSEMBLIES, and CLADDING for a BUILDING or FACILITY must be anchored to resist wind- or earthquake-induced overturning, uplift, and sliding, and must provide continuous load paths for those forces to the foundation.

.6 The tie-down of trusses or rafters to the rest of the structure must be sized for the wind classification, spacing of trusses and span of the trusses according to AS/NZS 1170.2 Wind Loads.

.7 Occupied roofs must be designed for LIVE LOADS that are commensurate with the intended use.

.8 Roofs containing photovoltaic solar panels must be designed for the full panel and ballast DEAD LOAD, including concentrated loads from support frames in combination with roof LIVE LOAD, and any other applicable loads.

.9 GREEN ROOFS (see Section H8) must be designed to support the additional weight of saturated GROWING SUBSTRATE, plants and other components of the GREEN ROOF system in wet and dry weather.

B1.B Foundations and Waterproofing

.1 Site grading must have a 5% minimum slope directing water away from a foundation, or a foundation drainage system (extending a minimum of 1.0 m horizontal distance away from the structure or a greater distance if required to provide protection during extreme weather events)) that drains SURFACE WATER at an acceptable flow rate.

.2 Foundations and footings must have structurally sound construction and comply with the minimum standards indicated in Table B1.B.2. Changes to Table B1.B.2 are appropriate if the BUILDING, FACILITY or SITE is susceptible to a DISASTER such as cyclones or tsunamis, in which case provisions in Section J Natural Disaster Resilience must be followed. Requirements for footing depth derived from a site-specific geotechnical report will take precedence.

Table B1.B.2: Construction Requirements for Concrete Foundations

Construction Requirement	Slab on Grade	Concrete Columns / Piles	Concrete Wall (cast in Situ and/or Concrete Block)
Minimum depth	175 mm	900 mm	1.0 m depth on at least one side
Minimum width	dimensions according to desired size to fit BUILDINGS, outdoor patios, etc.	sized and spaced according to LIVE and DEAD LOADS, minimum 450mm dia.	sized and spaced according to LIVE and DEAD LOADS, minimum width of 300mm
Minimum structural reinforcement	6x6-W2.9xW2.9 welded wire fabric, placed 1” from the surface or equivalent, by an approved manufacturer	structural rebar (E-grade rebar 500 mBa Steel), or equivalent, by an approved manufacturer	structural rebar (E-grade rebar 500 mBa Steel), or equivalent, by an approved manufacturer
Vapour Barrier	applied to underside of slab	applied to all sides where a high WATER TABLE will potentially affect the footing	applied to all parts below grade
Setting bed	150 mm minimum depth crushed stone base	150 mm minimum depth crushed stone base	150 mm minimum depth crushed stone base
Soil Compaction	soil compacted to 95% SPD (Standard Proctor Density)	soil compacted to 95% SPD (Standard Proctor Density) or other permeable material with equal structural strength	soil compacted to 95% SPD (Standard Proctor Density) or other permeable material with equal structural strength
Backfill	n.a.	150 mm width of crushed stone or other permeable material with equal structural strength	150 mm width of crushed stone or other permeable material with equal structural strength
Other		constructed to allow an embedded wood or steel post set 100 mm above bottom of footing, or contain an embedded steel post anchor at top of footing installed according to manufacturer’s instructions	be set on a 150 mm depth concrete footing running the length of the foundation wall

.3 WATERPROOFING foundations must include one or a combination of the following mitigation methods appropriate for site conditions, building function, size and massing:

(a) raising the BUILDING elevation so that the foundation is greater than 1.5 m above the WATER TABLE

(b) applying a sheet membrane WATERPROOFING system to all sides of the foundation or footings subject to hydrostatic pressure

(c) applying a WATERPROOF coating to all parts of the foundation exposed to water

(d) installing a perforated pipe 150 mm below the footing that is connected to an OUTLET

(e) exterior drainage mats

(f) applying appropriate sealant to all joints, which may include bentonite clay or certified below-grade sealants

(g) polyethylene-coated draft paper and glass-reinforced WATERPROOF paper extrusion coated on both sides with polyethylene

.4 WATERPROOFING membranes must extend below the foundation or footing, and extend up the height of the wall to just below grade.

B1.C Building Lifespan

.1 From the time a certificate of occupancy is issued, BUILDINGS, FACILITIES AND SITE SERVICING must, with only normal maintenance, continue to satisfy the PERFORMANCE REQUIREMENTS of this Code for the intended LIFESPAN of the BUILDING as indicated in Table B1.A.6.

.2 Where the SITE SERVICING of a BUILDING, FACILITY, or other structure is less than the intended LIFESPAN of the BUILDING, easy access must be provided for timely replacement of those elements or systems, so that the objective of the NBC and design are maintained without the need for reconstruction or major renovation.

.3 All BUILDINGS in BUILDING GROUPS 1 and 2, and **Assembly**/**Office**/**Commercial/Mixed Use** BUILDINGS in BUILDING GROUP 3 must demonstrate DURABILITY, efficient use of BUILDING MATERIALS, and reduction of the CARBON FOOTPRINT by the preparation and implementation of one of the following Building Life Cycle Evaluation system, or an approved equivalent:

- Athena Impact Estimator (IE) - an on-line assessment tool that provides ratings for fossil fuel consumption, GLOBAL WARMING POTENTIAL, acidification potential, eutrophication potential, ozone depletion and smog potential for foundations, walls, beams,columns, floors and roofs
  http://www.athenasmi.org/our-software-data/impact-estimator/

- eTool CD - a web-based Life Cycle Assessment using the IMPACT database
  http://etoolglobal.com/wp-content/uploads/2016/03/eTool-LCA-Training-Certificate.pdf

- Green Guide Calculator by BRE Global which is available to BREEAM and CSH Assessors
  https://www.bre.co.uk/greenguide/calculator/page.jsp?id=2071

- BEES Building for Environmental and Economic Sustainability life cycle assessment
  https://www.nist.gov/services-resources/software/bees

B1.D External Concrete Panel Walls in Buildings Less Than 3 Storeys

.1 Concrete EXTERNAL WALLS that could collapse as complete panels (eg. tilt-up and pre-cast concrete) in a BUILDING or FACILITY less than 3 STOREYS, must have adequate fire protection and comply with Specification C1.11 Performance of External Walls in Fire in the Building Code of Australia, Volume 1, if they have the following characteristics:

(a) consist of either single or multiple panels attached by steel connections to lateral supporting members

(b) depend on those connections to resist outward movement of the panels relative to the supporting members

(c) have height to thickness ratio not greater than 50

.2 Concrete EXTERNAL WALLS that are subject to Section B1.D1 above must have the following characteristics (as derived from Specification C1.11 Performance of External Walls in Fire in the Building Code of Australia, Volume 1):

(a) cast-in inserts and fixings, where used, must be anchored into the panel with welded bars or be fixed to the panel reinforcement

(b) cast-in inserts for top connections and fixings acting together, where used, must be able to resist an ultimate load of two times the larger of the forces required to develop:
(i) the ultimate bending moment capacity of the panel at its base, or
(ii) the overturning moment at the base of the panel arising from an outwards lateral displacement at the top of the panel equal to one tenth of the panel height

(c) top connections of the panel exposed to fire, such as clips and drilled-in inserts, acting together must be able to resist an ultimate load of six times the larger of the forces required to develop the moment specified in (b)(i) or (ii)

NOTE: The increased forces specified by use of the multiplier of two or six in (b) and (c) above are to take account of the lower strength of the connections and members at the higher than ambient temperatures expected in a fire.

(d) lateral supporting members and their connections must be designed to resist the connection forces specified in (b) and (c) and in the case of an EAVES tie member the force in the member must be determined assuming that it deforms in a manner compatible with the lateral displacement of the wall panels, and that it acts in tension only

(e) EXTERNAL WALL panels that span vertically must have at least two upper connections per panel to the supporting member, except that where a number of panels are designed to act as one unit, (e.g. tongue and groove hollow-core panels), only two upper connections are required for each unit.

(f) EXTERNAL WALL panels that span horizontally between columns must have at least two connections at each column

(g) connections providing lateral support to a panel must be designed to remain engaged to the supported panel both before and during a fire

.3 Where vertical spanning EXTERNAL WALL panels are located adjacent to columns, connections to the panels must be located and/or detailed to minimise forces that may develop between the panels and columns arising from the restraint of differential displacement by:

(a) detailing the connections and/or the supporting member to sustain a relative outward displacement between the panels and columns at the connection height where d(m) is calculated as:
(i) the square of the connection height (m) divided by one hundred and twenty-five, when the connection height is less than 5 m, or

(ii) the connection height (m) divided by twenty-five, when the connection height (m) is greater than or equal to 5 m, or

(b) connecting an EAVES tie member providing lateral support to EXTERNAL WALL panels no closer than a distance (s) from the columns where s(m) is taken as one quarter of the panel height (m)

B1.E Lightweight Construction

.1 LIGHTWEIGHT CONSTRUCTION means construction which incorporates or comprises:

(a) sheet or board material, plaster, render, sprayed application, or other material similarly susceptible to damage by impact, pressure or abrasion, or

(b) concrete and concrete products containing pumice, perlite, vermiculite, or other soft material similarly susceptible to damage by impact, pressure or abrasion, or

(c) masonry having a thickness less than 70 mm

.2 Protection from injury from a steel column covered by FIRE-RESISTANT LIGHTWEIGHT CONSTRUCTION can be accomplished by:

(a) protecting the covering with metal or other suitable material if the column is liable to damage from the movement of vehicles, materials or equipment

(b) filling the voids with solid NON-COMBUSTIBLE material to a height of not less than 1.2 m above the floor to prevent indenting if the covering is not in continuous contact with the column

(c) installing a plug of NON-COMBUSTIBLE material to seal all voids at each floor level, including voids between the column and its covering if:
(i) a steel column extends through 2 or more STOREYS
(ii) the fire-resisting covering is not in continuous contact with the column

.3 LIGHTWEIGHT CONSTRUCTION must comply with Specification C1.8 Lightweight Construction in the Building Code of Australia, if it is used in a wall system:

(a) that is required to have an FRL, or

(b) for a lift SHAFT, stairway SHAFT or SITE SERVICING SHAFT or an EXTERNAL WALL bounding a PUBLIC CORRIDOR including a non-fire-isolated passageway or non-fire-isolated ramp, in a spectator stand, sports **Stadium**, cinema or theatre, railway station, bus station or airport terminal

.4 If LIGHTWEIGHT CONSTRUCTION is used for the FIRE-RESISTING covering of a steel column or the like:

(a) the void must be filled solid, to a height of not less than 1.2 m above the floor to prevent indenting if the covering is not in continuous contact with the column

(b) the covering must be protected by steel or other suitable material if the column is liable to be damaged from the movement of vehicles, materials or equipment

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ACCEPTABLE SOLUTIONS

AS 1289: 2000 Methods of Testing Soils for Engineering Purposes
AS 2159: 1995 Rules for the Design and Installation of Piling (known as the SAA Piling Code)
AS 2327: 2003 Composite Structures - Part 1 Simply Supported Beams
AS 2870: 2011 Residential Slabs and Footings - Construction
AS 3600: 2009 Concrete Structures
AS 3610: 1995 Formwork for Concrete Series
AS 3700: 2011 Masonry Structures
AS 4100: 1990 Steel Structures
AS 4678: 2003 Earth-Retaining Structures
AS 4773.1: 2010 Masonry in Small Buildings - Design
AS 4955: 2006 Wind Loads for Housing
AS 5104: 2005 General Principles on the Reliability of Structures

AS/NZS 1170: 2002 Structural Design Actions
Part 0: 2002 General Principles Amends 1,2,3,4,5
Part 1: 2002 Permanent, Imposed and Other Actions
Part 2: 2002 Wind Actions Amends: 1,2,3
Part 5: 2004 Earthquake design actions - New Zealand Standards
AS/NZS 3012: 2010 Electrical Installations - Construction and Demolition Sites
AS/NZS 4456.10: 2003 Masonry Units and Segmental Pavers and Flags
AS/NZS 4671: 2001 Steel Reinforcing Materials

ASTM D1586-99: 1999 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils
ASTM D2166-00: 2000 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D2850-95: 1999 Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils
ASTM E72-80: 1981 Standard Method of Conducting Strength Tests of Panels for Building Construction
ASTM E695-79: 1985 Standard Method of Measuring Relative Resistance of Wall, Floor and Roof Construction

BS 8004: 1986 Code of Practice for Foundations
BS 8102: 2009 Code of Practice for Protection of Below Ground Structure Against Water from the Ground

NZS 2295: 2006 Pliable, Permeable Building Underlays
NZS 4203: 1992 Code of Practice for General Structural Design and Design Loadings for Buildings
NZS 4229: 2013 Concrete Masonry Buildings Not Requiring Specific Engineering Design
NZS 4230: 2004 Design of Reinforced Concrete Masonry Structures
NZS 4219: 2009 Seismic Performance of Engineering Systems in Buildings

ISO 2394: 1988 General Principles on Reliability for Structures

SUBMISSION

- Construction Drawings indicating how all performance objectives have been achieved regarding materials, loads, strength of BUILDING MATERIAL, list of ACCEPTABLE SOLUTIONS
- Evidence that STRUCTURAL MEMBERs are expected to achieve the Durability Goals in Table B1.9
- Building Life Cycle Evaluation Report, where applicable

B2 Sitework

REQUIRED PERFORMANCE

.1 SITEWORK must not compromise the DURABILITY of any BUILDING, FACILITY or natural feature intended to be retained in its usual condition, or any BUILDING, FACILITY or natural feature on adjacent property.

.2 SITEWORK and associated supports must take into account the impact on all of the following:

(a) anticipated changes in GROUNDWATER level and quality

(b) pre- and post-construction topography, grading, natural features and vegetation

(c) ground loss and landslip potential

(d) potential for NATURAL DISASTERS (see Section J)

(e) STORMWATER MANAGEMENT (see Section B2.D)

(f) foundation characteristics, size, massing and placement on SITE of the BUILDING, FACILITY or SITE SERVICING (see Section B1.A and B1.B)

.3 STORMWATER MANAGEMENT for all BUILDING SITES must be designed to remove SURFACE WATER in a manner that avoids:

(a) damage or nuisance to the BUILDING, FACILITY and/or SITE, or to adjacent property

(b) the likelihood of blocked access to BUILDINGS, FACILITIES or activities on SITE

(c) blocked access for maintenance of BUILDINGS, FACILITIES, SITE SERVICING and activities on SITE

DEEMED-TO-SATISFY PROVISIONS

B2.A Construction Safety

.1 Where an Earthworks Plan is required by the Government of Samoa as part of the Development Consent Application process, it must be submitted as part of the BUILDING PERMIT application to demonstrate compliance with Section B2, and must be updated to illustrate additional requirements outlined in the NBC.

.2 Earthwork must be stockpiled and suitably protected during construction to minimise any harm caused by dust to the SITE or to adjacent property, or any harm from sedimentation of watercourses.

.3 Drainage and silt fences around stockpiled earth must:

(a) ensure RUNOFF does not contaminate any natural watercourses or bodies of water

(b) maintain natural water drainage conditions of the SITE

(c) have sufficient fall to shed water and prevent ponding

.4 Earthwork in a COASTAL ZONE must be protected so that it will not be compromised by STORM SURGE during a weather event by:

(a) locating stockpiles a sufficient distance from the shoreline

(b) locating stockpiles at a suitable elevation

(c) providing temporary barriers such as sandbags, rock piles, along with protective covering

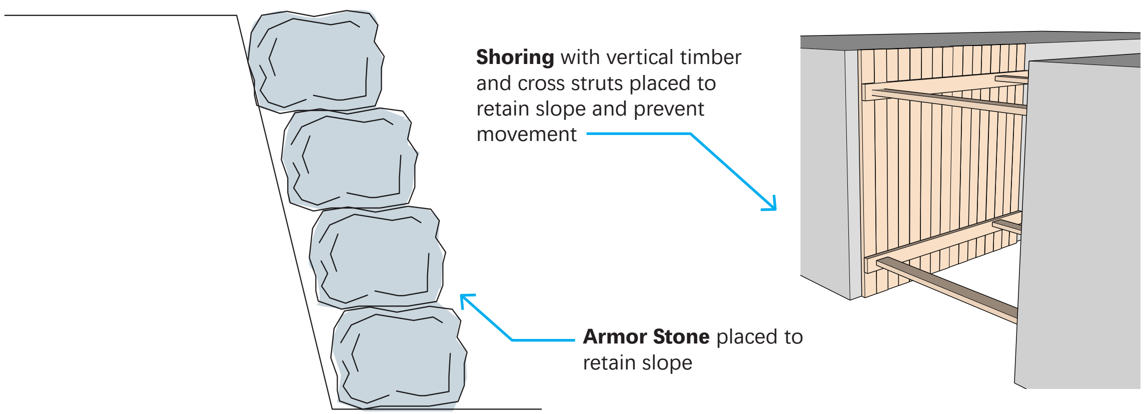
.5 Stability of existing BUILDINGS, FACILITIES, roads or other SITE elements to be retained in its usual condition during construction will be achieved by:

(a) adequate SETBACK of earthwork from the retained SITE element so that stability is not compromised

(b) shoring, temporary rock wall, or other suitable method of slope stabilisation (as illustrated in the examples in Figure B2.A.5 below and according to Section B2.B) unless side slopes are 1:1 slope or less

(c) provision of temporary fencing around trees, SITE elements, and/or the entire SITE with signage indicating no disturbance is permitted beyond the fenceline

Figure B2.A.5 Example of Shoring of Exposed Slopes During Construction



.6 Construction Documents (tender) must contain provisions for the following best practices during construction and demolition:

(a) protect authorised personnel from injury resulting from falling objects, fire, blasts, tripping, falling or an other risk posed by the construction or demolition operation

(b) prevent the entry of unauthorised personnel and unauthorised vehicles on the construction or demolition site

(c) protect adjacent property from moderate to extensive damage resulting from any construction or demolition activity

.7 Activities during construction or demolition must do the following:

(a) limit the accumulation of COMBUSTIBLE materials on site

(b) safeguard equipment and operations from ignition sources

(c) limit exposure to HAZARDOUS SUBSTANCES and known health HAZARDS to acceptable levels

(d) protect the site, people and the environment from damage due to wind, rain or other DISASTERS likely to occur during construction

.8 Any open pit or trench left open at night must have a minimum 600 mm height pile of soil around the top perimeter of sufficient width to discourage an unintended entry into the excavation

B2.B Slope Stability, Erosion and Sedimentation

.1 Design and construction of SITEWORK, SITE SERVICING and SITES must demonstrate effective means of stabilising slopes, controlling erosion and preventing sedimentation of natural watercourses appropriate to the topography and hydrology of the site and surrounding area, and intended occupancy and use.

.2 Mitigative measures to stabilise slopes, and control erosion and sedimentation must comply with the most updated and approved provisions in the following documents:

(a) Samoa Environmental Codes of Practice, 2007

(b) Samoa Floodplain Management: A Guideline for Planning and Development Assessment, 2007

(c) any other legislation, policy, plan or guidelines by the Government of Samoa

.3 Slope stabilisation must be achieved by one or more of the suggested techniques listed in Table B2.B.3, or by an ALTERNATIVE SOLUTION.

Table B2.B.3: Slope Stabilisation and Erosion Control Techniques

Slope Stabilisation and Erosion Control	Slopes < 3:1 (horizontal : vertical)	Slopes > 3:1
Structural Engineering Techniques		
Retaining walls	✓	✓
SEAWALLS / breakwalls	✓	✓
Gabion baskets / rip rap	✓	✓
Tire walls	✓	✓
Earthwork Techniques		
Battered slopes	✓	✓
Constructed terraces / benched slopes	✓	✓
Landforming	✓	requires reinforcement above 2:1 slope
Preservation / no cut and fill	✓	✓
Bioengineering Techniques		
Seeding / Planting	✓	must be combined with other techniques
Mulch / compost	✓	must be combined with other techniques
Erosion control blankets / geotextile		max. 1:1 slope
Loose rock blankets	✓	max. 1:1 slope
Branch wattles filled with shredded coconut fibres	✓	must have max. 3:1 slope between wattles
Living and timber crib walls	✓	additional tiebacks required for slopes > 1:1.
Live staking / branch packing	✓	must be combined with geotextile mats
Alternative Solutions		
Any technique that achieves required performances and complies with other provisions in the NBC	✓	✓

.4 Slopes less than 5% that are not part of a roadway, walkway, or landscape feature need only be protected through landscape techniques such as seeding, planting, rockery, stone beds or other suitable method.

B2.C Groundwater and Saturated Soil

.1 SITEWORKS and BUILDING construction must minimise impacts on GROUNDWATER level and quality.

.2 Where a geotechnical investigation is deemed necessary by the Government of Samoa, the study must include but not be limited to the following:

(a) identify the likelihood of adverse conditions or DISASTERS occurring (e.g. almost certain, possible, rare), and evaluate the risk associated with each

(b) indicate the severity of the consequences associated with each DISASTER including, but not limited to:
- (i) pathogens (e.g. viruses)
- (ii) inorganic chemicals (e.g. major ions, metals)
- (iii) salinity and sodicity
- (iv) nutrients (e.g. nitrogen, phosphorus, organic carbon)
- (v) organic chemicals (e.g. pesticides and hydrocarbons)
- (vi) turbidity and particulates (e.g. suspended solids)
- (vii) radionuclides (e.g. alpha radiation)

(c) identify the impact of proposed BUILDING, FACILITY, SITE SERVICING and SITEWORK on the quantity of GROUNDWATER and the height of the WATER TABLE

(d) identify levels of action needed, including:
- (i) no action
- (ii) site investigation with monitoring
- (iii) GROUNDWATER protection measures during and after construction
- (iv) remedial action plan to reduce impacts of construction
- (v) prohibition / clean up
- (vi) required maintenance and monitoring

.3 Good drilling, bore installation, monitoring and decommissioning practices for bore holes must be in conformity with National Bore Construction Standards (Minimum Construction Requirements for Water Bores in Australia, NUDLC 2012, as amended) and acceptable to the Government of Samoa.

.4 Where a BUILDING or FACILITY is on a perched or high WATER TABLE, WATERPROOFING as outlined in Section B1.B.5 and B1.B.6 must be installed, and if this is deemed to be inadequate protection, an alternative location must be found.

.5 ON-SITE WASTEWATER MANAGEMENT must be suitably designed to mitigate harmful effects on the environment because of a high WATER TABLE.

B2.D Stormwater Management

.1 STORMWATER MANAGEMENT of the BUILDING and SITE must:

(a) protect / enhance the natural landscape of the SITE and adjacent property

(b) reduce contamination of SURFACE WATER and GROUNDWATER

(c) reduce risk of FLOODING of BUILDINGS, FACILITIES, SITE and adjacent property

(d) comply with provisions in the Natural Disaster Resilience section of the NBC (Section J)

.2 The design of the STORMWATER MANAGEMENT system (natural and mechanical equipment and techniques) must comply with applicable sections in the NBC and with other applicable legislation, policy and procedures listed in Table B2.D.2 below or any other government policy documents.

Table B2.D.2: Applicable Legislation, Policy and Procedures for Stormwater Management

Stormwater Management Objectives	Applicable Section in NBC	Applicable Legislation, Policy and Procedures in Samoa
Stormwater quantity	B2 Siteworks H1 Coastal Properties H7 Green Roofs	Government of Samoa Stormwater Management Manual (to be initiated) COEP - Roadworks, Drainage
Stormwater quality	B2 Siteworks E Hazardous Substances G6 Non-residential waste	Government of Samoa Stormwater Management Manual (to be initiated) COEP - Roadworks, construction, erosion, earthworks Contamination Control Guidelines - operating procedures
Disaster Resilience	J Natural Disaster Resilience - Cyclones, Tsunamis, Landslides	National Disaster Management Plan National Fire Plan Samoa Floodplain Management: A Guideline for Planning and Development Assessment, 2007
Slope stability	B2 Sitework H1 Coastal Properties JE Landslips	COEP - road, construction, erosion control, slope stability, coastal protection, drainage, earthworks Samoa Floodplain Management: A Guideline for Planning and Development Assessment, 2007
Building stability	B1 Stability B2 Siteworks B3 Unstable Buildings and Demolition	Samoa Floodplain Management: A Guideline for Planning and Development Assessment, 2007 COEP - erosion, slope stability, earthworks, coastal protection

.3 Where stormwater modeling is required by the Government of Samoa, quantity of surface RUNOFF and the DESIGN FLOOD LEVEL must be calculated for:

(a) 50-year storm

(b) 100-year storm

(c) 500-year storm

and BUILDING SITING, SITEWORKS and STORMWATER MANAGEMENT must comply with Table J1.3 Disaster Resilience Benchmarks for BUILDING GROUPS in Section J Climate Change Adaptation.

.4 Grading plans for a BUILDING PERMIT must provide construction details of all STORMWATER MANAGEMENT techniques indicated in the approved Development Consent Application and any others deemed to be necessary by the Government of Samoa, including any or all of the following:

(a) constructed wetlands, channels, ponds, swales

(b) appropriate grading and landscaping to slow RUNOFF and detain it such as landscaped terraces, SOAKPITS, bioswales

(c) treatment facilities – oil and water separators or other means

(d) OUTFALL protection

(e) connections to DRAINAGE DITCHES in the ROAD RESERVE or the RETICULATED STORMWATER SYSTEM

(f) infiltration techniques – permeable paving, dry wells

(g) collection for drinking water

(h) collection and re-use for irrigation, farming

(i) GUTTERS, downspouts, leaders

(j) ALTERNATIVE SOLUTION

.5 Structures in BUILDING GROUP 1-3 must have a maintenance and monitoring schedule that:

(a) identifies all STORMWATER MANAGEMENT facilities requiring maintenance and monitoring

(b) identifies roles, responsibilities, reporting structure

(c) indicates yearly maintenance schedule for the LIFESPAN of the proposed land use activity

B2.E Roof Drainage System

.1 The roof drainage system, consisting of GUTTERS, downspouts and leaders, must be sized appropriate to:

(a) the predicted storm severity for the SITE based on meteorology data published by the Government of Samoa:
  (i) EAVES GUTTERS must accommodate the 50 year storm
  (ii) internal box and valley GUTTERS must accommodate the 100 year storm

(b) roof catchment area for EAVES GUTTERS appropriate to the average rainfall intensity

(c) roof catchment area for internal and box GUTTERS appropriate to the average rainfall intensity

(d) downpipes spaced:
  (i) no greater than 12 m apart
  (ii) no greater than 1.2 m from a valley GUTTER, unless the GUTTER is sized to accommodate additional overflow

(e) minimum downpipe size:
  (i) 100 mm x 50 mm rectangular, or
  (ii) 90 mm diameter

.2 The roof drainage system must be designed so that any overflow during heavy rain periods is prevented from flowing back into the BUILDING or FACILITY, and roof RUNOFF is directed a minimum 1.0 m away from EXTERNAL WALLS and the foundation.

.3 Internal stormwater drains, GUTTERS and downpipes are prohibited, unless a detailed report indicates that no other design solution can be reasonably used

.4 All water discharged from a GUTTER / valley or downpipe onto a tiled roof must be prevented from inundating or penetrating the tiling by the provision of:

(a) a spreader pipe, or

(b) flashing, or

(c) SARKING-TYPE MATERIAL installed with a minimum width of 1800 mm either side from the point of discharge and extended down to the EAVES GUTTER

.5 GUTTERS must be installed with a fall of not less than:

(a) 1:500 for EAVES GUTTERS, unless fixed to metal FASCIA

(b) 1:100 for box GUTTERS

.6 EAVES GUTTERS must be supported by brackets securely fixed at stop ends and at not more than 1.2 m centres.

.7 Valley GUTTERS on a roof with a PITCH:

(a) more than 12.5 degrees — must have width of not less than 400 mm and be wide enough to allow the roof covering to overhang not less than 150 mm each side of the GUTTER, or

(b) not more than 12.5 degrees — must be designed as a box GUTTER

.8 Where high-fronted GUTTERS are installed, provision must be made to avoid any overflow back into the roof or building structure by incorporating overflow measures or the like.

.9 An adequate overflow system must be provided if the size and capacity of drainage components to remove all water anticipated during heavy rain periods cannot accommodate the expected volume.

.10 BUILDING MATERIAL for GUTTERS, downpipes and flashings must be compatible with roofing materials and not contain any lead if used on a roof forming part of a POTABLE water catchment area, and comply with:

(a) metal components - AS/NZS 2179.1

(b) UPVC components - AS 1273

ACCEPTABLE SOLUTIONS

AS 3610: 1998 Formwork for Concrete Series
AS 6001: 1999 Working Platforms for Housing Construction
AS 6669: 2007 Plywood - Formwork

AS/NZS 1254: 2010 PVC Pipes and Fittings for Stormwater and Surface Water Applications
AS/NZS 1576.1: 2010 Scaffolding - General Requirements, and Part 4 Suspended Scaffolding
AS/NZS 2032: 2006 Installation of PVC Pipe Systems
AS/NZS 2033: 2008 Installation of Polyethylene Pipe Systems
AS/NZS 2566: 2002 Buried Flexible Pipelines
AS/NZS 3500.3: 2015 Stormwater Drainage and 3500.5 Household Installations
AS/NZS 4576: 1995 Guidelines for Scaffolding
AS/NZS 4586: 2004 Slip Resistance Classification of New Pedestrian Surface Materials
AS/NZS 4994.1: 2009 Temporary Edge Protections - General Requirements

ASTM D1586-99: 1999 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils
ASTM D2166-00: 2000 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D2850-95: 1999 Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

ANZECC and ARMCANZ Australian and New Zealand Fresh and Marine Water Quality Guidelines

BS 8000.11.1: 1990 Workmanship on Building Sites - Code of Practice for Wall and Floor Tiling - Natural StoneTiles

NHMRC and NRMMC 2011 Australian Drinking Water Guidelines

NZS 4402: 1988 Methods of Testing Soils for Civil Engineering - Part 2 Soil Classification Tests, Part 4: Soil Compaction Tests
NZS 4431: 1989 Code of Practice for Earth Fill for Residential Development

New Zealand Geomechanics Society - Guidelines for the Field Descriptions of Soils and Rocks in Engineering Use, 1998

SUBMISSION

- Construction Drawings that meet all PERFORMANCE REQUIREMENTS and indicate solutions to providing effective STORMWATER MANAGEMENT for the construction of BUILDINGS and the SITE

- Grading Plans showing all aspects of the STORMWATER MANAGEMENT SYSTEM

- Construction details of all STORMWATER MANAGEMENT features

B3 Unstable Buildings and Demolition

REQUIRED PERFORMANCE

.1 A BUILDING, FACILITY, SITE SERVICING or activities on SITE which are failing, have fallen into disrepair and/or threaten the health and safety of occupants or adjacent properties, or has been declared as a nuisance by the Ministry of Health, must either be repaired so that it meets the standards of the NBC or declared an UNSTABLE BUILDING and demolished.

.2 The demolition of UNSTABLE BUILDINGS, FACILITIES, SITE SERVICING and activities on SITE must be carried out in a way that avoids the likelihood of premature collapse.

.3 Demolition Plans must include provisions for all of the following:

(a) safety of the public and personnel from injury or death

(b) avoidance of damage and nuisance to other properties from dust, vibrations, noise, water, fire, smoke and fumes

(c) continued access to other properties

(d) exhibition of appropriate notices warning the public

(e) prevention of damage to WATER SUPPLY, UTILITIES and WASTEWATER PIPES, and telecommunication lines, and allow their continued use

.4 The method and sequence of demolition must be planned in detail with due allowance for the following:

(a) sudden release of locked up forces such as with pre-stressed concrete, arches, cantilevers etc

(b) the HEIGHT of the structure

(c) clear space available

(d) the presence of HAZARDOUS SUBSTANCES such as gas cylinders, aerosol spray cans, drums containing flammable material or explosive dusts, foam plastics, asbestos, etc

(e) the structural condition of the BUILDING

(f) the presence of basements, cellars, vaults and other voids and the effect of removal of structural walls

(g) the requirement for any cutting, welding or burning

(h) the requirement for temporary supports, shoring scaffolding and the like and the loads including impact loads that they may have to take

(i) the loads from the stationing and operation of demolition equipment especially if supported on parts of the BUILDING being demolished

(j) any other likely factors that could present a danger to human activity or the environment

.5 Construction details for BUILDING PERMITS must include the ease of disassembly and reconfiguration potential regarding fastening and adhesive sequence, use of standard size and modular size materials, CLADDING type, and using mechanical connections in lieu of chemical , wherever possible.

DEEMED-TO-SATISFY PROVISIONS

B3.A Unstable Buildings

.1 Any BUILDING which has any of the conditions or defects described below must be deemed to be an UNSTABLE BUILDING, if such conditions or defects exist to the extent that the life, health, safety or property of the public or its occupants are endangered whenever:

(a) any BUILDING EXIT, ACCESSIBLE EXIT, or EMERGENCY EXIT is not of sufficient width or size or is not so arranged as to provide safe and adequate means of egress in case of fire or other emergency

(b) the stress in any materials or member due to all applicable loads, is more than 1.5 times the working stress or stresses allowed for new BUILDINGS of similar type of construction

(c) any portion of the BUILDING has been damaged by fire, earthquake, wind, FLOODING, FLASH FLOOD or by any other cause, to such an extent that its structural strength or stability is materially less than it was before such catastrophe and is less by 33 percent or more than the minimum requirements for new BUILDINGS of similar type of construction

(d) any portion or member or attachment of the BUILDING is likely to fail, or to become detached or dislodged, or to collapse and thereby injure persons or damage property

(e) any portion of the BUILDING has suffered distortion, cracking or settlement to such an extent that walls or other structural portions have materially less resistance to winds or earthquakes than is required in the case of similar new construction

(f) the BUILDING or any portion of it is likely to collapse or fail to perform the intended function, as a result of any one of the following:
- (i) dilapidation, deterioration or decay
- (ii) faulty construction
- (iii) the removal, movement or instability of any portion of the ground necessary for the purpose of supporting such BUILDING
- (iv) the deterioration, decay or inadequacy of its foundation
- (v) any other cause

(g) the BUILDING exclusive of the foundation, shows 33 percent or more damage or deterioration of any supporting member or 50 percent damage or deterioration of its non-supporting members

(h) any BUILDING has in any non-supporting part, member or portion less than 50 percent, or in any supporting part, member or portion less than 66 percent of the:
- (i) strength, or
- (ii) fire-resisting requirements

(i) a BUILDING because of inadequate maintenance, dilapidation, decay, damage, faulty construction or arrangement, inadequate light, air or sanitation facilities, or otherwise, is likely to cause sickness or disease.

B3.B Termites

.1 Methods of termite treatment must include an appropriate and effective combination of one, any or all of the following in the design and construction of BUILDINGS and FACILITIES, appropriate to the foundation type, ground floor type, and adjacent ground treatment:

(a) physical barriers that comply with AS 1694 and/or AS 3660, such as:
- (i) metal ant-caps as traditionally used for elevated timber FRAMING
- (ii) stainless steel mesh either to the perimeter and around PLUMBING pipes, or full ground cover under slab on ground
- (iii) graded granite consisting of crushed and angular granite particles laid and compacted under slab on ground, plus collars around PLUMBING pipes or perimeter and penetration installation where the slab is laid according to AS 3600

(iv) combined termite and moisture barrier such as two layers of LDPE (Low Density Polyethylene) plastic chemically treated to provide WATERPROOFING and termite protection functions in one product

(v) metal flashing using marine grade aluminium

(b) soil treatment that complies with AS 2057

(c) chemical treatment that complies with AS 3660

.2 The following BUILDING MATERIALS are exempt from requiring termite treatment:

(a) steel, aluminium or other metals

(b) concrete, masonry, or reinforced cement

(c) timber that is naturally resistant to termites, such as:
- native cypress pine (Callitris spp.)
- river red gum (Eucalyptus corymbosa)
- grey box (Eucalyptus moluccana)
- yellow box (Eucalyptus melliodora)
- ironbark (Eucalyptus siderophloia)

(d) timber treated with an acceptable preservative

(e) plastics and polycarbonates

(f) other material approved for exemption by the Government of Samoa

.3 Hand-sprayed chemicals for termite protection under concrete slabs must:

(a) provide evidence that they have a reasonable LIFESPAN before they can be used

(b) be an approved product according to Australian and/or New Zealand standards

(c) be combined with a reticulation system to allow maintenance and re-application

.4 Suspended floors that require termite protection must have:

(a) access doors or panels that allow access for inspection, maintenance and treatment

(b) a minimum clearance of 400 mm between the finished ground level and the floor or any other obstructions (bearers, floor joists, PLUMBING pipes, etc.)

(c) cross-floor ventilation between the suspended floor and the ground that is:

(i) cleared of all debris and vegetation

(ii) cross-ventilated by means of openings

(iii) contains no dead AIR SPACES

(iv) graded to prevent SURFACE WATER ponding under the BUILDING

(v) evenly spaced ventilation openings

(d) provided in both leaves of a double leaf masonry wall, with inner-leaf openings being aligned with outer-leaf openings to allow an unobstructed flow of air

.5 INTERIOR WALLS constructed in sub-floor spaces must be provided with openings having an unobstructed area equivalent to that required for the adjacent external openings and be evenly distributed to promote air flow.

.6 Where the ground or sub-floor space is excessively damp or subject to frequent FLOODING:

(a) the area of sub-floor ventilation must be increased by 50%, or

(b) a sealed IMPERVIOUS membrane must be provided over the ground, or

(c) H3 preservative treated timbers in accordance with AS 1684.2, AS 1684.3 or AS 1684.4 must be used

.7 All penetrations for SITE SERVICING or other means through a foundation, slab on grade or suspended floor must be adequately protected for termite infestation.

.8 Concrete paths or driveways placed against a BUILDING or FACILITY may require a chemical reticulation system to be installed in the ground before installation where there is a danger of termite infestation.

.9 Any attachments to a BUILDING or FACILITY such as a wood DECK, covered porch, fence etc. must have adequate termite protection between the attachment and the EXTERNAL WALL.

.10 When construction is complete and/or an OCCUPANCY PERMIT is issued, the builder must provide the owner information on the termite management system installed and the owner's ongoing maintenance responsibilities.

B3.C Demolition

.1 Demolition of all BUILDINGS and FACILITIES must comply with AS 2601 - The Demolition of Structures, and must result in no harm to people, the environment or neighbouring properties.

.2 Any resulting excavation must be filled to the existing grade and meet other objectives in the NBC such as effective STORMWATER MANAGEMENT and slope stability.

.3 A Demolition Plan is required for BUILDINGS and FACILITIES that:

(a) are located close enough to the property boundary such that the HEIGHT of the structure exceeds the distance between its base and the property boundary

(b) contain HAZARDOUS SUBSTANCES

(c) may cause harm to people or neighbouring property upon its demolition

(d) are located in the urban area of Apia

.4 The Demolition Plan must contain provisions for:

(a) handling HAZARDOUS SUBSTANCES

(b) termination of utilities

(c) handling of ON-SITE WASTEWATER MANAGEMENT system

(d) protection of workers and visitors such as construction railings, barriers

(e) hoarding and protection of adjacent property

(f) environmental protection from noise, dust, air pollution, water contamination

(g) waste handling - waste avoidance at source, plans for reuse

(h) recycling and re-use of building products - identification, stockpiling, transportation

(i) scheduling

(j) sequence of events

(k) final condition of the property

ACCEPTABLE SOLUTIONS

Code of Practice for Demolition of Buildings, 2004, Building Department, Hong Kong

Demolition - Best practice guidelines for demolition in New Zealand, WorkSafe New Zealand, NZDAA

Demolition Work Code of Practice, July 2012, Safework Australia

SUBMISSION

- Construction Drawings that meet all PERFORMANCE REQUIREMENTS and indicate solutions to making a UNSTABLE BUILDING become DURABLE and be DISASTER RESILIENT if the BUILDING or FACILITY is to be retained

- Demolition Plan that meets all PERFORMANCE REQUIREMENTS indicating a safe and proper method for removal of a BUILDING or STRUCTURE and ensuring the SITE is left in a safe and stable condition

B4 Building Materials

REQUIRED PERFORMANCE

.1 BUILDING MATERIALS must:

(a) comply with the DURABILITY requirements of Australian and New Zealand Standards and Acceptable Solutions

(b) be suitable for their desired level of performance, location and environment

(c) be compatible with adjoining materials

(d) be appropriate for use within the BUILDING or FACILITY

(e) comply with GREENHOUSE GAS EMISSION reduction targets (see Section H6)

.2 BUILDING MATERIALS must endure for the LIFESPAN of the BUILDING unless:

(a) the BUILDING MATERIALS do not provide structural support to the BUILDING (including floor coverings, wall coverings, and fixings)

(b) PLUMBING and built-in chimneys and flues and other servicing are exposed in the subfloor space and/or are only moderately difficult to access and replace, and would be easily detected during normal maintenance

(c) BUILDING MATERIALS (including linings, renewable protective coatings, and SANITARY FIXTURES) are easy to access and replace

.3 Asbestos is not permitted as a BUILDING MATERIAL or a component in a BUILDING MATERIAL unless it can be demonstrated that the structure or part thereof cannot be built with an alternative material or there is not another ALTERNATIVE SOLUTION. In such a case where asbestos is permitted, health and safety standards for its installation, use, and extraction during demolition must meet the applicable standards in the NBC for HAZARDOUS SUBSTANCES. (see Section E Hazardous Substances).

DEEMED-TO-SATISFY PROVISIONS

B4.A Durability Standards for Building Materials

.1 BUILDING MATERIALS must comply with the following performance standards, or an approved equivalent, acceptable to the Government of Samoa regarding SUSTAINABILITY, functionality and DURABILITY:

(a) **Masonry**

(i) Code of practice for masonry buildings, materials and workmanship: NZS 4210 / AS 3700
(ii) Code of practice for masonry buildings not requiring specific design: NZS 4229
(iii) Code of practice for design of masonry structures: NZS 4230

(b) **Concrete**

(i) Design of concrete structures: NZS 3101 Part 1 and 2 / AS 3600
(ii) Specification for concrete construction: NZS 3109
(iii) Specification for concrete construction for minor works: NZS 3124
(iv) Reinforced Concrete Masonry Unit NZS 4230: 2004
(v) Specification C1.11 Performance of External Walls in Fire in the Building Code of Australia, Volume 1, and Section C2.C Concrete External Walls for Buildings Less than 3 Storeys in the NBC

(c) **Steel construction**: NZS 3404
Steel Structures: AS 4100
Cold-formed steel structures: AS/NZS 4600
Residential and low-rise steel FRAMING: NASH Standard Residential and Low-rise Steel Framing Part 1 or Part 2

(d) **Aluminium construction:** AS 1664

(e) **Timber construction:** AS 1720, NZS 3603 and/or AS 1684 Part 2, 3 or 4

(f) **Particleboard structural flooring:** AS 1860

(g) **EXTERNAL WALL CLADDING** - no structural damage when tested to TR 440 to withstand impact from a 4 kg piece of timber of nominal cross-section 100 mm x 50 mm striking end on at a velocity of 15 m/s

.2 Connectors, sufficient number of nails or screws, and correct placement, size and strength of fasteners must comply with AS/NZS 1684.3.

ACCEPTABLE SOLUTIONS

AS 1050: 2015 Methods for the Analysis of Iron and Steel Series
AS 1012: 1993 Methods of Testing Concrete Series
AS 1231: 2000 Aluminium and Aluminium Alloys - Anodic Oxidation Coatings
AS 1316: 2003 Masonry Cement
AS 1379: 2007 Specification and Supply of Concrete Series
AS 1391: 2007 Metallic Materials - Tensile Testing at Ambient Temperature
AS 1397: 2001 Steel Sheet and Strip - Hot Dipped Zinc-Coated or Aluminium/Zinc-coated
AS 1442: 2007 Carbon Steels and Carbon-Manganese Steels - Hot-Rolled Bars and Semi-Finished Products
AS 1444: 2007 Wrought Allow Steels - Standard, Hardenability (H) Series
AS 1445: 2013 Hot-Dipped, Zinc-Coated, Aluminium / Zinc-Coated or Aluminium / Zinc / Magnesium-Coated Steel Sheet - 76 mm pitch corrugated
AS 1448: 2007 Carbon Steel and Carbon-Manganese Steels - Forgings
AS 1478: 1992 Chemical Admixtures for Concrete Mortar and Grout Series
AS 1548: 2008 Fine Grained, Weldable Steel Plates for Pressure Equipment
AS 1562: 1992 Design and Installation of Sheet Roof and Wall Cladding - Metal
AS 1604: 1997 Specification for Preservative Treatment Series - Timber
AS 1684.1: 1999 Residential Timber-Framed Construction - Design Criteria
AS 1684.2: 2010 Residential Timber-Framed Construction - Non-Cyclonic Areas
AS 1684.4: 2010 Residential Timber-Framed Construction - Simplified - Non-Cyclonic Areas
AS 1720.1: 2010 Timber Structures - Design Methods
AS 1789: 2003 Electroplated Zinc (electrogalvanized) Coatings on Ferrous Articles (batch process)
AS 1815: 1991 Metallic Materials - Rockwell Hardness Test Series
AS 1816: 1990 Metallic Materials - Brinell Hardness Test Series
AS 1817: 1991 Metallic Materials - Vickers Hardness Test Series
AS 1830: 2007 Grey Cast Iron
AS 1831: 2007 Ductile Cast Iron
AS 1832: 2007 Malleable Cast Iron
AS 1874: 2000 Aluminium and Aluminium Alloys - Ingots and Castings
AS 2027: 2007 Abrasive-Resistant Cast Irons
AS 2049: 2002 Roof Tiles
AS 2050: 2002 Installation of Roof Tiles
AS 2074: 2003 Cast Steels
AS 2082: 2007 Timber - Hardwood - Visually Stress-Graded for Structural Purposes
AS 2327.1: 2003 Composite Structures - Simply Supported Beams
AS 2345: 2006 Dezincification Resistance of Copper Alloys
AS 2350 (Frc): Methods of Testing Portland and Blended Cements Series
AS 2701: 2001 Methods of Sampling and Testing Mortar for Masonry Constructions
AS 2858: 2008 Timber - Softwood - Visually Stress-Graded for Structural Purposes
AS 3582: 1996 Supplementary Cementitious Materials for Use with Portland and Blended Cement Series
AS 3600: 2009 Concrete Structures

AS 3610: 1995 Formwork for Concrete Series
AS 3700: 2011 Masonry Structures
AS 3818: 2009 Timber - Heavy Structural Products - Visually Graded Series
AS 3850: 2003 Tilt-Up Concrete Construction
AS 3958.1: 2007 Ceramic Tiles - Guide to the Installation of Ceramic Tiles
AS 4046: 1992 Methods of Testing Roof Tiles Series
AS 4100: 1998 Steel Structures
AS 4440: 2004 Installation of Nailplated Timber Trusses
AS 4459: 1997 Methods of Sampling and Testing Ceramic Tiles Series
AS 4662: 2003 Ceramic Tiles - Definitions, Classification, Characteristics and Marking
AS 4678: 2002 Earth-Retaining Structures
AS 4773.1: 2010 Masonry in Small Buildings - Design
AS 4992: 2006 Ceramic Tiles - Grouts and Adhesives Series
AS 5049: 2007 Cast Iron- Designation of Microstructure of Graphite
AS 5052: 2007 Compacted (vermicular) Graphite Cast Irons - Classification
AS 5604: 2005 Natural Durability Ratings - Timber
AS 6669: 2007 Plywood - Formwork

AS/NZS 1080: 2012 Timber - Methods of Test Series
AS/NZS 1163: 2009 Cold-Formed Structural Steel Hollow Sections
AS/NZS 1604: 2002 Part 3 Specification for Preservative Treatment of Plywood
AS/NZS 1664: 1997 Part 1 Aluminium Structures
AS/NZS 1734: 1997 Aluminium and Aluminium Alloys - Flat sheet, Coiled Sheet and Plate
AS/NZS 1748: 1997 Timber - Street Graded - Product Requirements for Mechanically Stress-Graded Timber
AS/NZS 1859: 2002 Reconstituted Wood-Based Panels - Part 1 Particleboard
AS/NZS 1865: 1997 Aluminium and Aluminium Alloys - Drawn Wire, Rod, Bar and Strip
AS/NZS 1866: 1997 Aluminium and Aluminium Alloys - Extruded Rod, Bar and Hollow Shapes
AS/NZS 1867: 1997 Aluminium and Aluminium Alloys - Drawn Tubes
AS/NZS 2097: 2006 Methods for Sampling Veneer Plywood
AS/NZS 2098: 2006 Methods of Test for Veneer and Plywood Series
AS/NZS 2269: 2004 and 2008 Plywood - Structural
AS/NZS 2271: 2004 Plywood and Blockboard for Exterior Use
AS/NZS 2350: 2006 Methods of Testing Portland and Blended Cements Series
AS/NZS 2588: 1998 Gypsum Plasterboard
AS/NZS 2589: 2007 Gypsum Lining - Application and Finishing
AS/NZS 2699: 1984 Built-in Components for Masonry Construction
    Part 1: 2000 Wall Ties
    Part 2: 2000 Connectors and Accessories
    Part 3: 2002 Lintels and Shelf Angles
AS/NZS 2728: 2007 and 2013: Prefinished/Prepainted Sheet Metal Products for Interior/Exterior Building Applications
AS/NZS 2908: 2000 Cellulose Cement Products - Part 1: Corrugated Sheets, and Part 2: Flat Sheets
AS/NZS 3678: 1996 Structural Steel - Hot-Rolled Plates, Floorplates and Slabs
AS/NZS 3679.1: 2010 Structural Steel - Hot-Rolled Bars and Sections
AS/NZS 3725: 2007 Design for Installation of Buried Concrete Pipes
AS/NZS 4063: 1992 Characterisation of Structural Timber Series
AS/NZS 4200.2: 1994 Pliable Building Membranes and Underlays - Installation Requirements
AS/NZS 4256: 1994 Plastic Roof and Wall Cladding Materials
AS/NZS 4331: 1995 Metallic Flanges
    Part 1: Steel Flanges
    Part 2: Cast Iron Flanges
    Part 3: Copper Alloy and Composite Flanges
AS/NZS 4455: 1997 Masonry Units and Segmental Pavers
AS/NZS 4456: 2003 Masonry Unit and Segmental Pavers - Methods of Test
AS/NZS 4600: 2005 Cold-Formed Steel Structures
AS/NZS 4671: 2001 Steel Reinforcing Materials
AS/NZS 4680: 2006 Hot-Dip Galvanised (zinc) Coating on Fabricated Ferrous Articles
AS/NZS 4792: 2006 Hot-Dip Galvanized (zinc) Coatings on Ferrous Hollow Sections

ISO 21930: 2007 Sustainability in Building Construction – Environmental Declaration of Building Products

NZS 3101: 1995 Concrete Structures Standard - Part 1: 2006 Design

NZS 3106: 2009 Design of Concrete Structure for the Storage of Liquids
NZS 3109: 2007 Specification for Concrete Construction
NZS 3112: 2011 Methods of Test for Concrete
Part 2: 1986 Tests Relating to the Determination of Strength of Concrete
NZS 3114: 1987 Specification for Concrete Surface Finishes
NZS 3116: 2002 Concrete Segmental and Flagstone Paving
NZS 3404: 1997 Steel Structures Standard
NZS 3602: 2003 Part 1 Timber and Wood-Based Products for Use in Buildings
NZS 3603: 1993 Timber Structures Standard
NZS 3604: 1990, 1999 and 2011 Timber Framed Buildings
NZS 3605: 2001 Timber Piles and Poles for Use in Building
NZS 3617: 1979 Specification for Profiles of Weatherboards, Fascia Boards, and Flooring
NZS 3622: 2004 Verification of Timber Properties
NZS 3631: 1988 New Zealand Timber Grading Rules
NZS 3640: 2003 Chemical Preservation of Round and Sawn Timber
NZS 4206: 1992 Concrete Interlocking Roofing Tiles
NZS 4210: 2001 Code of Practice for Masonry Construction: Materials and Workmanship
NZS 4217: 1980 Pressured Metal Tile Roofs
NZS 4223: 2016 Code of Practice for Glazing in Buildings
Part 1: 2008 Glass Selection and Glazing
Part 2: 1985 The Selection and Installation of Manufactured Sealed Insulting Glass Units
Part 3: 1999 Human Impact Safety Requirements
Part 4: 2008 Wind, Dead, Snow and Live Actions
NZS 4229: 2013 Concrete Masonry Buildings not Requiring Specific Engineering Design
NZS 4230: 2004 Design of Reinforced Concrete Masonry Structures
NZS 4236: 2002 Masonry Veneer Wall Cladding
NZS 4251: 2007 Solid Plastering - Cement Plaster for Walls Ceilings and Soffits
NZS 4256: 1994 Plastic Roof and Wall Cladding Materials
Part 2: 1964 Unplasticised Polyvinyl Chloride (uPVC) Building Sheets 240 M

ASTM A240M: 2016 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

BS 5385: 2009 Wall and Floor Tiling Code of Practice
BS 8298: 1994 Code of Practice for Design and Installation of Natural Stone Cladding and Lining
BS EN 988: 1977 Zinc and Zinc Alloys - Specification for Rolled Flat Products for Building
BS EN 1172: 1997 Copper and Copper Alloys - Sheet and Strip for Building
BS EN 1759: 2004 Flanges and Their Joints
Part 1: 2004 Circular Flanges for Pipes, Valves, Fittings and Accessories, Class-Designated, Steel Flanges

BRANZ Bulletin 330: 1995 Thin Flooring Materials, Preparation and Laying
BRANZ Bulletin 411: 2001 Recommended Timber Cladding Profiles
BRANZ EM 4: 2005 Evaluation Method for Jointing Systems for Flush Finished Fibre Cement Sheet
BRANZ EM 5: 2005 Evaluation Method for Adhesives and Seam Tapes for Butyl and EPDM Rubber Membranes

CCANZ CP01: 2014 Code of Practice for Weathertight Concrete and Concrete Masonry Construction

EN 1469: 2004 Natural Stone Products - Slabs for Cladding - Requirements
EN 10088.1: 2005 Stainless Steels
EN 12057: 2004 Natural Stone Stiles - Modular Tiles - Requirements
EN 12058: 2004 Natural Stone Products - Slabs for Floors and Stairs - Requirements
EN 19059: 2004 Natural Stone Products - Dimensional Stone Work - Requirements

ICBO Evaluation Services Inc AC148: Acceptance Criteria for Flashing Materials

ISO/TS 15510: 2003 Stainless Steels - Chemical Composition
ISO 8336: 1993 Fibre Cement Flat Sheets

New Zealand Metal Roof and Wall Cladding Code of Practice: 2008

NASH (National Association of Steel Framed Housing Inc. Standard: Residential and Low Rise Steel Framing

Part 1: 2005 Design Criteria
Part 2: 2014 Design Solutions

Environmental Performance
ANSI/GBI 01: 2010 Green Building Assessment Protocol for Commercial Buildings, April, 2014

Green Globes for New Construction Technical Manual

New Zealand Green Building Council List of Recognised Eco-labels

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved and list of ACCEPTABLE SOLUTIONS used.
- List of ACCEPTABLE SOLUTIONS and Standards supporting the performance level of each BUILDING MATERIAL
- Specifications of GLAZING strength and composition for each type of window (see Appendix C)
- BUILDING PERMIT application must list GREEN BUILDING TECHNIQUES used and how they achieve performance targets
- List of all Eco-Labels, EPDs, VOC rating, and other third-party verifications that achieve the performance objectives

B5 Glazing and Windows - Structure and Safety

REQUIRED PERFORMANCE

.1 Placement and composition of windows and GLAZING in EXTERNAL WALLS, INTERIOR WALLS, partitions and roofs in all structures must:

(a) ensure structural STABILITY

(b) not cause harm to humans, adjacent property, and the environment

.2 The number and type of windows must be appropriate for the structural loads of the BUILDING and/or FACILITY.

.3 GLAZING or other brittle materials with which people are likely to come into contact with must comply with one or more of the following:

(a) resist a reasonably foreseeable impact without breaking

(b) be reasonably protected from impact

(c) if broken upon impact, break in a way that is unlikely to cause injury

.4 Fasteners for frameless GLAZING panels must be composed of appropriate materials designed to adequately support GLAZING and resist impacts appropriate to the occupancy and use of the BUILDING and/or FACILITY.

.5 Windows and GLAZING must be made visible where there is potential for mistaking it for a route of travel.

.6 GLAZING used as a fall protection barrier, such as on staircases and balconies or a partition wall, must withstand potential human impacts and consequences of weather.

DEEMED-TO-SATISFY PROVISIONS

B5.A Materials and Structural Integrity

.1 All GLAZING must comply with AS/NZS 4223 Glazing in Buildings, or an equivalent acceptable to the Government of Samoa, regarding:

(a) Part 1 (2016) – glass selection and GLAZING materials, general design criteria, assemblies

(b) Part 2 (2016) - insulating glass units minimum standards

(c) Part 4 (2016) – minimum glass thickness for vertical and sloped overhead GLAZING to resist limit state actions

.2 Glass panels in windows, doors, walls and roofs must be correctly sized for the wind loads (according to AS/NZS 1170) and the window or door frame, and sufficiently fixed to the structure of the BUILDING or FACILITY according to the recommendations of the New Zealand Safety Glass Association.

.3 FRAMING must meet requirements of AS/NZS 4223.1 in terms of strength, stability, barrier loads, and wind loads,

or be considered as an unframed edge and be subject to appropriate safety provisions in AS/NZS 4223 and/or the requirements of the New Zealand Safety Glass Association.

.4 Substitutions of GLAZING types (annealed, toughened, SAFETY GLASS, etc.) must be in accordance with NZS 4223.

B5.B Human Impact Safety

SEE APPENDIX C FOR SPECIFIC REQUIREMENTS FOR GLASS PANEL TYPE, PANE WIDTH AND GLASS TYPE

.1 GLAZING required to resist breakage includes that found in areas most likely to be in contact with humans and are not protected from human impact by railings, screens, or the like, including:

(a) doors, and door side panels

(b) low level GLAZING - any part of which is located within:
- (i) 800 mm from the FINISHED FLOOR in an early childhood centre
- (ii) 1,000 mm from the FINISHED FLOOR in all other HABITABLE BUILDINGS and structures

(c) within 2,000 mm horizontal or vertical distance of stairs, ramp and balcony, and if used as a fall barrier on stairs, ramp or balcony

(d) in and around WET AREAS, including shower doors, vanity doors, mirrors, other partitions, etc. in BATHROOMS, ensuites and spas located in the 2,000 mm safety zone

(e) protecting a fall of 1,000 mm or more

(f) in areas used for high risk activities
- (i) gymnasiums, sports courts, or marked fields - all GLAZING wholly or partly within 2,000 mm vertically and 5,000 mm horizontally of the sealed surface of sports courts/fields
- (ii) swimming pools - all GLAZING wholly or partly within 2,000 mm vertically or horizontally of the walking surface alongside swimming pools and space
- (iii) schools - all GLAZING in the Safety Zone (within 2,000 mm above the FINISHED FLOOR)
- (iv) early childhood centres - all Low Level GLAZING (within 800 mm above the FINISHED FLOOR)
- (v) stadiums
- (vi) public viewing galleries
- (vii) assembly halls
- (vii) other areas deemed suitable by the Government of Samoa

(g) in public halls and rooms where GLAZING or windows are less than 2,000 mm from the FINISHED FLOOR

(h) internal partitions

(i) mirror and glass wall CLADDING within 2,000 mm above the FINISHED FLOOR unless fully backed and completely adhered to a solid material

(j) shopfronts

(k) window seats

(l) sashless windows (will be subject to special design)

(m) louvres

.2 Exemptions from H2.B.1 above include:

(a) GLAZING in lift cars and liftwells

(b) furniture and cabinet glass, vanities, glass basins, refrigeration units, internal glass fitments, glass wall linings, framed internal wall mirrors, and mirrors

(c) BUILDINGS and structures with no public access intended for non-habitable, horticultural and/or agricultural use

(d) restoration or repair of existing decorated glass

(e) GLAZING that might fail due to stresses other than tensile stresses, such as glass floors

(f) plastic GLAZING materials

(g) glass blocks, pavers, slumped, formed or cast glass

(h) point-fixed or point-supported systems used for GLAZING, CLADDING, signage

.3 To protect humans from potential injury, all GLAZING must meet the standards of the New Zealand Safety Glass Association (NZSGA), or an equivalent acceptable to the Government of Samoa, as well as Appendix C regarding:

(a) type of glass

(b) maximum area

(c) minimum nominal thickness

(d) maximum number of vertical butt joints per opening

(e) maximum number of panels per opening

(f) maximum individual panel width

.4 SAFETY GLASS must bear identification markings indicating that the pane has been cut from SAFETY GLASS material in accordance with requirements in NZS 4223.3.

.5 Manifestation of GLAZING (making it visually apparent when it could be mistaken for a doorway or unimpeded path of travel), must be part of the installation for the following:

(a) doors and door side panels

(b) low level GLAZING, if any part of GLAZING is located:
  (i) 800 mm from the FINISHED FLOOR in an early childhood centre
  (ii) 1,000 mm from the FINISHED FLOOR in all other HABITABLE BUILDINGS and structures

(c) shower doors and bath enclosures

(d) shopfronts

(e) internal partitions

(f) within 2,000 mm of a stairway or ramp

(g) any GLAZING where fall protection is required, see Section B5.C below

(h) any other area deemed appropriate by the Government of Samoa

.6 Manifestation of GLAZING must not be considered as a substitute for the use of SAFETY GLASS where it is required, and must be clearly visible under all conditions of artificial and/or natural lighting.

.7 Manifestation of GLAZING must consist of:

(a) provision of a clearly visible opaque band, motif or other decorative treatment (minimum 20 mm wide) across the full width of the glazed opening at a height:

(i) for an early childhood centre - the centreline positioned 800 mm above the FINISHED FLOOR,

(ii) for all other BUILDINGS, the centreline must be between 800 and 1,200 mm above the FINISHED FLOOR

OR

(b) other clearly visible demarcation acceptable to the Government of Samoa

.8 Leadlights and decorative glass must have individual panes that do not exceed:

(a) 0.1 m^2 for 3.0 mm annealed glass

(b) 0.3 m^2 for 4.0 mm annealed glass

(c) 0.5 m^2 for 5.0 mm annealed glass

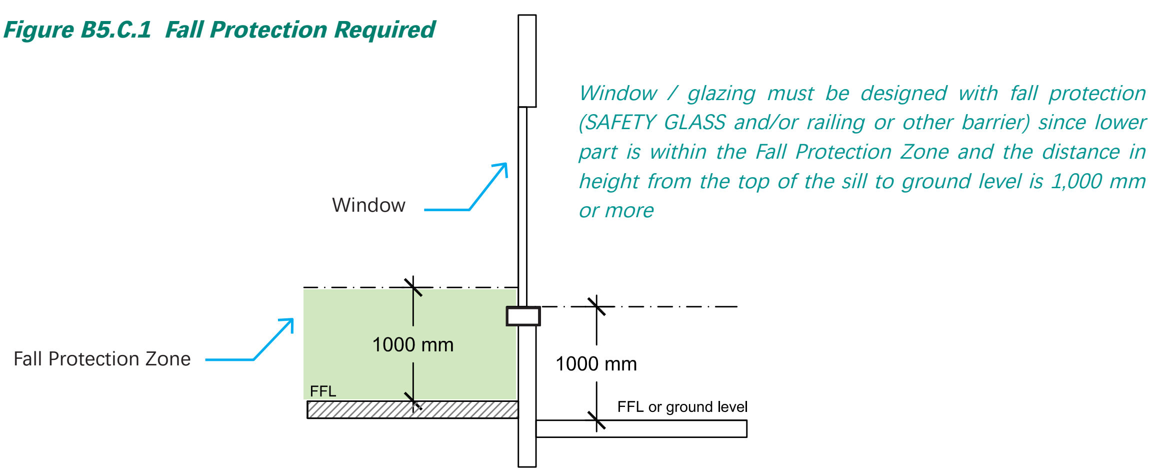
B5.C Glazing for Fall Protection

.1 GLAZING must be designed to safeguard against a fall, as in the example shown in Figure B5.C.1, where it is:

(a) located within the Fall Protection Zone (1,000 mm from the FINISHED FLOOR)

(b) protects a difference in grade of 1,000 mm or more

Figure B5.C.1 Fall Protection Required



.2 GLAZING with fall protection must consist of the following glass types:

(a) fully framed - SAFETY GLASS that complies with Table 7, Appendix C

(b) partly framed, full height - SAFETY GLASS that complies with Table 8, Appendix C

(c) other - subject to a specific design

.3 Glass barriers (BALUSTERS, fences, or screens) that safeguard occupants from falling 1,000 mm or more are subject to all provisions in Section D3.C Fall Protection in the NBC, in addition to wind load provisions in AS/NZS 1170.

.4 Glass screens over 1,500 mm in height and full length glass screens acting as a glass barrier must have the following glass types and size requirements:

(a) fully framed must comply with Table 7 in Appendix C of the NBC (aka Table 7 in NZS 4223)

(b) partly framed, full height glass barriers must comply with Table 8 in Appendix C of the NBC (aka Table 8 in NZS 4223)

.5 For fall protection, glass infill barriers must comply with Tables 9 through 17 in NZS 4223 Glazing in Buildings, regarding design load, wind pressure, and maximum glass span.

Glass infill barrier on stairs and landing

ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings – Selection and Installation
AS 2047: 2014 Windows and External Glazed Doors in Buildings - Selection and Installation
AS 2208: 2006 Safety Glazing Materials in Buildings
AS 5039: 2008 Security Screen Doors and Security Window Grilles
AS 5040: 2003 Installation of Security Screen Doors and Window Grilles

AS/NZS 1170.2: 2011 Structural Design Actions - Wind actions - Wind Loads for Windows
AS/NZS 4667: 2000 Insulating Glass Units

NZS 4223 2016 Glazing in Buildings

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- PRODUCT INFORMATION SHEET for prefabricated windows,glass panels, panes, partitions, CLADDING, including R-VALUES and environmental performance

Section C

Fire Protection

Contents

Table C1 Overview of Applicable Sections in the NBC - Section C

Section C

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
C1 Prevention of Fire Occurring																
C1.A	Electrical Protection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C1.B	Incinerator Rooms	•	•	•	•		•	•	•	•		•	•	•		•
C1.C	Electrical Rooms	•	•	•	•		•	•	•	•		•	•	•		•
C1.D	Open Fireplaces and Ovens	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C1.E	Chimneys and Flues	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C1.F	Lightning Protection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C2 Fire Spread Reduction																
C2.A	Setbacks to Reduce Fire Spread	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C2.B	Fire Hazard Properties For Linings, Materials And Assemblies	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C2.C	Fire Curtains and Fire Shutters	•	•	•	•		•		•	•		•	•	•		•
C3 Fire Compartments																
C3.A	Max. Size of Fire Compartments	•	•	•	•		•		•	•		•	•	•		•
C3.B	Large-Isolated Buildings	•	•	•	•		•		•	•		•	•	•		•
C3.C	Fire Compartments - Health-Care		•	•	•				•							
C3.D	Fire Compartments - Aged-Care		•	•	•				•							
C3.E	Fire Compartments- Multiple Unit	•	•	•	•		•		•	•		•	•			•
C3.F	Fire Walls	•	•	•	•		•		•	•		•	•	•		•
C3.G	Doorways in Fire Walls	•	•	•	•		•		•	•		•	•	•		•
C3.H	Horizontal Exits In Fire Walls	•	•	•	•		•		•	•		•	•	•		•
C3.I	Openings In External Walls	•	•	•	•		•		•	•		•	•	•		•
C4 Evacuation Route																
C4.A	Components and Layout	•	•	•	•		•		•	•		•	•	•		•
C4.B	FRL and Structural Stability	•	•	•	•		•		•	•		•	•	•		•
C4.C	Signage and Visibility	•	•	•	•		•		•	•		•	•	•		•
C4.D	Fire Doors	•	•	•	•		•		•	•		•	•	•		•
C4.E	Smoke Doors	•	•	•	•		•		•	•		•	•	•		•
C4.F	Fire-Isolated Passageways	•	•	•	•		•		•	•		•	•	•		•
C4.G	Fire-Isolated Stairways + Ramps	•	•	•	•		•		•	•		•	•	•		•
C4.H	Places of Safety	•	•	•	•		•		•	•		•	•	•		•
C4.I	Smoke Lobby	•	•	•	•		•		•	•		•	•	•		•
C4.J	Site Servicing Penetrations	•	•	•	•		•		•	•		•	•	•		•
C5 Fire Resistance																
C5.A	FRL of Building Elements	•	•	•	•		•		•	•	•	•	•	•	•	•
C5.B	Non-Combustible Materials	•	•	•	•		•		•	•	•	•	•	•	•	•
C5.C	Type A, B and C Definitions	•	•	•	•		•		•	•	•	•	•	•		•
C5.D	Building Elements	•	•	•	•		•		•	•	•	•	•	•	•	•
C5.E	Building Materials	•	•	•	•		•		•	•	•	•	•	•	•	•
C5.F	Incipient Spread Of Fire	•	•	•	•		•		•	•	•	•	•	•	•	•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:
STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

		Building Group					Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
		1	2	3	4	5										
C5 Fire Resistance (continued)																
C5.G	Carparks	•	•	•	•		•		•	•		•	•	•		•
C5.H	Mezzanines	•	•	•	•		•		•	•	•	•	•	•		•
C5.I	Stadiums	•	•	•												•
C5.J	Aged-Care Buildings	•	•	•	•				•							
C5.K	MU Residential - Type A Constr.		•	•	•		•									
C5.L	MU Residential - Type B Constr.		•	•	•		•									
C5.M	MU Residential - Type C Constr.		•	•	•		•									
C5.N	Health-Care /Assembly Buildings	•	•	•	•				•							•
C5.O	Single Residential/Minor Structures					•		•							•	
C5.P	Encroachments Single Residential					•		•							•	
C6 Protection of Openings																
C6.A	Exemptions and Interpretation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C6.B	Openings in Floors, Walls,Ceilings	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C6.C	Openings in Service Shafts	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C6.D	Materials - Building Groups 1-4	•	•	•	•		•		•	•	•	•	•	•	•	•
C6.E	Materials - Building Group 5					•		•								
C6.F	Construction Joint Openings	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C7 Fire Safety Systems - All Buildings																
C7.A	Fire Safety System Equipment	•	•	•	•		•		•	•	•	•	•	•		•
C7.B	Manual Fire Alarm Box	•	•	•	•		•		•	•	•	•	•	•		•
C7.C	SmokeDetectors/Automatic Alarm	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
C7.D	Compliant Sprinkler Systems	•	•	•	•		•		•	•		•	•	•	•	•
C7.E	Automatic Fire Suppression	•	•	•	•		•		•	•		•	•	•		•
C7.F	Portable Fire Extinguishers/ Blankets	•	•	•	•		•		•	•	•	•	•	•	•	•
C7.G	Fire Hose Reel	•	•	•	•		•		•	•		•	•	•	•	•
C7.H	Emergency Lighting	•	•	•	•		•		•	•	•	•	•	•		•
C7.I	Fire Access Route	•	•	•	•		•		•	•	•	•	•	•		•
C7.J	Fire Hydrants and Water Supply	•	•	•	•		•		•	•	•	•	•	•		•
C7.K	Fire Control Panel	•	•	•	•		•		•	•		•	•	•		•
C7.L	Building Access	•	•	•	•		•		•	•	•	•	•	•	•	•
C7.M	Fire Safety and Evacuation Plans	•	•	•	•		•		•	•		•	•	•		•
C7.N	Emergency Intercom and Sound	•	•	•	•		•		•	•		•	•	•		•
C7.O	Fire Windows	•	•	•	•		•		•	•	•	•	•	•		•
C8 Fire Safety Systems - Tall Buildings, Atria and Mezzanines																
C8.A	Smoke Control System	•	•	•	•		•		•	•		•	•	•		•
C8.B	Riser Mains and Water Supply	•	•	•	•		•		•	•		•	•	•		•
C8.C	Fire Pump Enclosure	•	•	•	•		•		•	•		•	•	•		•
C8.D	Fire Control Centre	•	•	•	•		•		•	•		•	•	•		•

C FIRE PROTECTION

Section C OBJECTIVES

C(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING must:

(a) safeguard people from an unacceptable risk of injury or illness cause by fire and smoke, or when evacuating a BUILDING during a fire

(b) avoid the spread of fire between BUILDINGS

(c) protect other property from damage cause by fire

(d) prevent unwanted ignition caused by equipment and SITE SERVICING

(e) facilitate firefighting and EMERGENCY RESPONDER operations

C1 Prevention Of Fire Occurring

REQUIRED PERFORMANCE

.1 BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING must be designed, altered, operated, maintained and demolished to control heat/energy sources and limit the occurrence of unwanted ignition.

.2 Fuel-burning appliances and FUEL SUPPLY must be installed to not cause uncontrolled combustion or explosion, or become a source of ignition.

.3 The maximum surface temperature of COMBUSTIBLE BUILDING MATERIALS close to fixed appliances using controlled combustion and other fixed equipment when operating at their design level must not exceed 90 °C.

.4 A heating appliance and its associated components within a BUILDING, including an open fireplace, chimney, or the like, must be installed:

(a) to withstand temperatures likely to be generated by the appliance

(b) so that it does not raise the temperature of any BUILDING ELEMENT to a level that would adversely affect the element's physical or mechanical properties or function

(c) so that hot products of combustion will not:
  (i) escape through the walls of the associated components
  (ii) cause fire to spread to nearby COMBUSTIBLE materials or allow smoke to penetrate nearby windows, ventilation inlets, or the like

.5 Where flammable, COMBUSTIBLE and explosive substances and atmospheres are permitted, potential ignition sources must be separated from areas containing these substances.

.6 Policies and procedures in the Government of Samoa Petroleum Task Force Safety Standards must be incorporated into the design, construction, operation and maintenance of any BUILDING, FACILITY and/or SITE using petroleum as a heating source, or for storage, handling and/or distribution.

DEEMED-TO-SATISFY PROVISIONS

C1.A Electrical Protection and Appliances

.1 To prevent unwanted ignition and combustion, installation of all ELECTRICAL EQUIPMENT and WIRING must comply with:

(a) AS/NZS 3000 - Electrical Installations - buildings, structures and premises (known as the SAA Wiring Rules)

(b) Section G4 Electrical Safety in the NBC

.2 ELECTRICAL EQUIPMENT and WIRING must be selected, installed and protected such that they will not:

(a) obstruct a FIRE-ISOLATED PASSAGEWAY, FIRE-ISOLATED STAIRWAY or RAMP, EVACUATION ROUTE or EMERGENCY EXIT

(b) contribute to, or propagate a fire

(c) attain a temperature high enough to ignite adjacent material

.3 ELECTRICAL EQUIPMENT and WIRING must have an appropriate FIRE-RESISTANCE in keeping with the level of protection required for the BUILDING, FACILITY, room, or part thereof, in accordance with AS/NZS 3013. CABLES not complying with the required FIRE-RESISTANCE level must be limited to short lengths for connection of appliances to a WIRING system, and must not pass from one FIRE COMPARTMENT to another.

.4 The installation of a stove, heater or similar appliance in a BUILDING must comply with:

(a) domestic solid-fuel burning appliances — Installation: AS/NZS 2918

(b) pressure equipment: AS/NZS 1200

C1.B Incinerator Rooms

.1 If an incinerator is installed in a BUILDING, any hopper giving access to a charging chute must be:

(a) NON-COMBUSTIBLE

(b) gas-tight when closed

(c) designed to return to the closed position after use

(d) not attached to a chute connecting directly to a flue unless the hopper is located in the open air

(e) not located in an EVACUATION ROUTE or EMERGENCY EXIT

.2 A room containing an incinerator must be separated from other parts of the BUILDING by construction with an FRL of not less than 60/60/60.

C1.C Electrical Rooms (substation, battery rooms)

.1 An ELECTRICAL ROOM with the following equipment must be within a stand-alone enclosure located far enough away from the BUILDING, FACILITY or fire source and with sufficient FIRE-RESISTING construction that the threat of spread of fire is minimised:

(a) transformers (for 1kV and above & its cooling design- indoor or outdoor)

(b) switchgears (for 1kV and above)

(c) generators (depending on cooling design and sound proofing as determined by the EPC)

.2 An ELECTRICAL ROOM must be protected from the spread of fire, and from becoming a source of fire by the following:

(a) FIRE-RESISTANT construction with a minimum FRL of 60/60/60 and/or NON-COMBUSTIBLE material

(b) allow air-intake at the bottom of the enclosure and air out-take at the highest point

(c) have batteries, FUEL CELLS, transformers, and the like, located on a mounted stand so that they do not come directly in contact with the walls, floor or ceiling of the enclosure

(d) have access / safety signs and perimeter markings that comply with Section E3 Hazardous Substances- Emergency Planning and Warning Signs below

(e) have a disconnection switch or quick-disconnect fuse near the entrance so that the ELECTRICAL EQUIPMENT can be isolated from the rest of the system

(f) have building material and ventilation that provides the appropriate room temperature for the equipment according to manufacturer's recommendations

(g) provide a natural means of lighting such as a window or ROOFLIGHT

(h) have sufficient access and working space maintained around all ELECTRICAL EQUIPMENT to permit ready and safe operation and maintenance of such equipment and avoid harm from LIVE parts

(i) ensure exposed high-voltage equipment, such as transformer banks, open switches, and similar equipment with exposed energized parts are isolated to prevent unauthorized access by fencing, locked rooms, screened enclosures, or other suitable means

.3 In addition to Section C1.D.2 above, a stand-alone ELECTRICAL ROOM must have the following:

(a) a concrete base, or base fabricated of other NON-COMBUSTIBLE material, no less than 100 mm thick

(b) adequate drainage around the enclosure such that RUNOFF or STORMWATER will not accumulate and pond around the base

(c) WEATHERTIGHT construction yet maintain sufficient ventilation

(d) be constructed with sufficient structural capacity for wind and seismic loads (see AS/NZS 1170), and to withstand the consequences of DISASTERS

.4 Electrical rooms may be combined with telecommunication equipment provided appropriate room temperature, fire protection and ventilation are maintained.

.5 FUEL CELLS and energy storage mechanisms such as batteries must be installed in a well-ventilated enclosure that:

(a) allows air-intake at the bottom of the enclosure and air out-take at the highest point

(b) is constructed of FIRE-RESISTANT materials

(c) uses fans, where additional ventilation is needed

(d) has a concrete base, or equivalent acceptable to the Government of Samoa

(e) has a mounted stand so that batteries and FUEL CELLs do not sit directly on the base

(f) access / safety signs-Section E3 Hazardous Substances-Emergency Planning and Warning Signs

(g) has a disconnection switch or quick-disconnect fuse near the FUEL CELL and/or batteries so they can be electrically isolated from the rest of the system

C1.D Open Fireplaces and Ovens

.1 An open fireplace, or solid-fuel burning oven or appliance in which the fuel-burning compartment is not enclosed must have:

(a) a hearth constructed of stone, concrete, masonry or similar NON-COMBUSTIBLE material so that:
- (i) it extends not less than 300 mm beyond the front of the fireplace opening and not less than 150 mm beyond each side of that opening
- (ii) it extends beyond the limits of the fireplace or appliance not less than 300 mm if the fireplace or appliance is free-standing from any wall of the room
- (iii) its upper surface does not slope away from the grate or appliance
- (iv) COMBUSTIBLE material situated below the hearth but not below that part required to extend beyond the fireplace opening or the limits of the fireplace is not less than 150 mm from the upper surface of the hearth

(b) walls forming the sides and back of the fireplace up to not less than 300 mm above the underside of the arch or lintel which:
- (i) are constructed in 2 separate leaves of solid masonry not less than 180 mm thick, excluding any cavity
- (ii) do not consist of concrete block masonry in the construction of the inner leaf

(c) walls of the chimney above the level referred to in (b):
- (i) constructed of masonry units with a net volume, excluding cored and similar holes, not less than 75% of their gross volume, measured on the overall rectangular shape of the units, and with an actual thickness of not less than 100 mm
- (ii) lined internally to a thickness of not less than 12 mm with rendering consisting of 1 part cement, 3 parts lime, and 10 parts sand by volume, or other suitable material

(d) suitable damp-proof courses or flashings so that it is WEATHERTIGHT

C1.E Chimneys and Flues

.1 A chimney or flue must be constructed:

(a) to withstand the temperature likely to be generated by the appliance to which it is connected

(b) so that the temperature of the exposed faces will not exceed a level that would cause damage to nearby parts of the BUILDING

(c) so that hot products of combustion will not:
  (i) escape through the walls of the chimney or flue, or
  (ii) cause fire to spread to nearby COMBUSTIBLE materials or allow smoke to penetrate through nearby-windows, ventilation inlets, or the like

(d) in such a manner as to prevent rainwater penetrating to any part of the interior of the structure

(e) such that its termination is not less than:
  (i) 600 mm above any point of penetration of or contact with the roof
  (ii) 900 mm above any opening or openable part in any structure, which is within 3 m horizontal distance of the chimney or flue

(f) so that it is accessible for cleaning

C1.F Lightning Protection

.1 All BUILDINGS and SITES on which non-residential human activity occurs must be protected from potential lightning strikes by provision of appropriate lightning protection (see Section G4.N Lightning Protection System).

ACCEPTABLE SOLUTIONS

Electrical

AS/NZS 2381: 2005 Electrical Equipment for Explosive Atmospheres - Selection, Installation and Maintenance
AS/NZS 3000: 2007 Electrical Installations - Buildings, Structures and Premises (known as the SAA Wiring Rules)
AS/NZS 3013: 2005 Electrical Installations - Classification of Fire and Mechanical Performance of Wiring System Elements
AS/NZS 3100: 2009 Approval and Text Specification: General Requirements for Electrical Equipment
AS/NZS 3112: 2011 Approval and Test Specification: Plugs and Socket Outlets
AS/NZS 3191: 2009 Electrical Flexible Cords
AS/NZS 5000.2: 2005 Electrical Cables - Polymeric Insulated - for Working Voltages up to and Including 0.6/1 (1.2) kV
AS/NZS 5000.2: 2006 Electrical Cables - Polymeric Insulated Part 2 - for Working Voltages up to and Including 450/750

NZECP 34: 2001 Electrical Safety Distances
NZEPC 36: 1993 Harmonic Levels
NZEPC 51: 2004 Homeowner/Occupier's Electrical Wiring Work in Domestic Installations
NZEPC 54: 2001 Installation of Recessed Luminaires and Auxiliary Equipment

Appliances

AS 1691: 1985 Domestic Oil-Fired Appliances - Installation

AS/NZS 2918: 2011 Domestic Solid Fuel Burning Appliances - Installation
AS/NZS 3350.2.35: 1999 Safety of Household and Similar Electrical Appliances
AS/NZS 3823: 2013 Performance of Electrical Appliances - Air Conditioners and Heat Pumps
AS/NZS 3869: 1999 Domestic Solid Fuel Burning Appliances - Design and Construction
AS/NZS 5601: 2013 Gas Installations and Part 1: 2010 General Installations Amend: 1
AS/NZS 60335: 2011 Household and Similar Electrical Appliances
AS/NZS 60598.1: 2013 Luminaires: General Requirements

NZS 5262: 2003 Gas Appliance Safety Amend: 1

Other

AS/NZS 1200: 2015 Boilers and Pressure Equipment
B1/ASE Acceptable Solution in New Zealand Building Code: Small Chimneys

The Handbook of Fire Protection Engineers, 4th edition, NFPA National Fire Protection Association, 2008

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Construction details must show all sources of combustion and protective methods against ignition and fire spread

C2 Fire Spread Reduction

REQUIRED PERFORMANCE

.1 BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING must be designed, sited and constructed with safeguards against the spread of fire so that there is a low probability of:

(a) fire spread to other BUILDINGS on SITE and to adjacent properties

(b) fire spread to EMERGENCY EXITS and EVACUATION ROUTES

(c) fire spread to adjoining FIRE COMPARTMENTS

(d) fire spread to UNITS and PUBLIC CORRIDORS in **Multiple Unit Buildings**

(e) spread of smoke and toxic gases within a BUILDING or FACILITY

.2 BUILDINGS with a HEIGHT greater than 10 m where upper floors contain sleeping uses must be designed and constructed so that there is a low probability of external vertical fire spread to upper floors in the BUILDING.

.3 BUILDING ELEMENTS and BUILDING MATERIALS must be such that if there is a fire:

(a) there is sufficient time for the orderly evacuation of the BUILDING based on:
- (i) the number, mobility and other characteristics of the occupants
- (ii) the function or use of the BUILDING
- (iii) any active FIRE SAFETY SYSTEM available

(b) EMERGENCY RESPONDERS can safely perform emergency procedures

(c) linings and ASSEMBLIES must resist the spread of fire and limit the generation of smoke, heat and any toxic gases likely to be produced appropriate to the function and occupancy of the BUILDING, FACILITY, SITE, or UNIT

.4 In calculating fire spread, the height of the exposing fire should be regarded as the HEIGHT in metres of the number of STOREYS involved in the exposing fire, considering such factors as the HEIGHT and layout, closure of vertical openings, and FIRE RESISTING CONSTRUCTION.

.5 Potential for fire damage to EXTERNAL WALLS must be reduced through any, some or all of the following methods appropriate to the BUILDING, FACILITY and SITE:

(a) adequate clear space between BUILDINGS based on the characteristics of the EXTERNAL WALL, occupancy and use of the BUILDINGS, FACILITY and/or SITE

(b) AUTOMATIC sprinkler protection for COMBUSTIBLE EXTERNAL WALLS

(c) EXTERNAL WALLS that face one another should not have facing windows, doors or other openings unless they are constructed with NON-COMBUSTIBLE materials

(d) construction of NON-COMBUSTIBLE barrier walls between BUILDING for the express purpose of reducing potential for fire spread

(e) extension of exterior masonry walls to form parapets or wings

(f) elimination of openings in wall cavities by filling with NON-COMBUSTIBLE construction

(g) glass block panels in openings

(h) wired glass in steel sash (fixed or AUTOMATIC closing) in openings

(i) AUTOMATIC window sprinklers

(j) AUTOMATIC (rolling steel) FIRE SHUTTERS or openings

(k) AUTOMATIC FIRE DOORS on door openings

(l) AUTOMATIC fire dampers on wall openings

(m) FIRE WINDOW assembly

DEEMED-TO-SATISFY PROVISIONS

C2.A Setbacks To Reduce Fire Spread

.1 Separation distance between BUILDINGS should be determined based on having sufficient FIRE RESISTANCE to contain the expected fire within the proposed BUILDING in accordance with provisions in:

(a) NFPA 80A Recommended Practice for Protection of Buildings from Exterior Fire Exposure, or

(b) Specification C1.1 of the Building Code of Australia, Volume 1

.2 EXTERNAL WALLS of BUILDINGS that are located closer than 1 m to the property boundary must be constructed to resist the spread of fire to adjacent property, and either:

(a) be constructed of NON-COMBUSTIBLE BUILDING MATERIALS, or

(b) for BUILDING GROUP 1 and 2, be constructed from materials that, when subjected to a RADIANT FLUX of 30 kW/m^2, do not ignite for 30 minutes, or

(c) for BUILDING GROUP 3 and 4, be constructed from materials that, when subjected to a RADIANT FLUX of 30 kW/m^2, do not ignite for 15 minutes, or

(d) be located at least 3.0 m from the property line

.3 To avoid the spread of fire between BUILDINGS and adjoining properties, BUILDINGS and FACILITIES may not cause HEAT FLUX in excess of that indicated in Table C2.A.3 (known as Verification Method CV1 in Building Code of Australia, Volume 1). In addition, BUILDINGS and FACILITIES on the same property must be capable of withstanding the HEAT FLUX in Table C2.A.3 without ignition.

Table C2.A.3: Building Setbacks based on Heat Flux

Location	Heat Flux (kW/m^2)
Distance between Building and Property Boundary	
On boundary	80
1 m from boundary	40
3 m from boundary	20
6 m from boundary	10
Distance between Buildings on Same Property	
0 m	80
2 m	40
6 m	20
12 m	10

Measurement of HEAT FLUX is most often done by measuring a temperature difference of a piece of material with known thermal conductivity. The THERMAL PERFORMANCE of a BUILDING refers to the process of modeling the energy transfer between a BUILDING and its surroundings. For a conditioned BUILDING, it estimates the heating and cooling load allowing the sizing and selection of HVAC equipment to be correctly made. For a non-conditioned BUILDING, it calculates temperature variation inside the BUILDING over a specified time and helps one to estimate the duration of uncomfortable periods.

.4 EMERGENCY EXITS must be setback a minimum of 3.0 m from the property line or from an adjacent BUILDING or HABITABLE FACILITY measured at right angles.

.5 SETBACKS for **Single Unit Residential** from property boundaries and other BUILDINGS, FACILITIES or structures must comply with Part 3.7.1 in the Building Code of Australia, Volume 2, with regard to fire protection, and any other planning requirements of the Government of Samoa.

C2.B Fire Hazard Properties For Linings, Materials And Assemblies

.1 Selected linings, materials and assemblies must comply with Fire Safety Standards for Fire Hazard Properties in DEEMED-TO-SATISFY PROVISION C1.10 in the Building Code of Australia, Volume 1 as summarised in Figure C2.B.1 below:

Figure C2.B.1: Required Fire Safety Standards for Selected Linings, Materials and Assemblies

<table>
<tr><th>Linings, Materials and Assemblies Subject to Required Fire Safety Standards</th><th>Required Fire Safety Standards for FIRE HAZARD PROPERTIES</th><th>Referred Standard</th></tr>
<tr><td>Floor linings, floor coverings and attachment</td><td rowspan="10">(a) Average Specific Extinction Area - for smoke according to AS/NZS 3837

(b) Critical RADIANT FLUX - the critical HEAT FLUX at extinguishment as determined by AS ISO 9239

(c) FLAMMABILITY INDEX - the index number as determined by AS 1530.2

(d) SMOKE-DEVELOPED INDEX - the index number for smoke as determined by AS/NZS 1530.3

(e) Smoke Growth Rate Index (SMOGRA$_{RC}$)-the index number for smoke applied to materials used as a finish, surface, lining or attachment to a wall or ceiling

(f) Smoke Development Rate - the development rate for smoke as determined by testing flooring materials in accordance with AS ISO 9239.1

(g) SPREAD-OF-FLAME INDEX - the index number for spread of flame as determined by AS/NZS 1530.3

(h) Group Number - the number of one of 4 groups of materials used in the regulation of FIRE HAZARD properties and applied to materials used as a finish, surface, lining or attachment to a wall or ceiling</td><td></td></tr>
<tr><td>Wall and Ceiling Linings and attachments</td><td></td></tr>
<tr><td>Ductwork for Air-handling</td><td></td></tr>
<tr><td>Lift Cars</td><td></td></tr>
<tr><td>Escalators and Moving Walkways</td><td></td></tr>
<tr><td>Stairways and Ramps NOT part of an EVACUATION ROUTE or EMERGENCY EXIT</td><td>Specification D1.12 Non-Required Stairways, Ramps and Escalators in the Building Code of Australia, Volume 1</td></tr>
<tr><td>SARKING-TYPE MATERIALS (eg. water proofing barrier, vapour barrier, thermal resistance)</td><td></td></tr>
<tr><td>Internal Linings of EXTERNAL WALLS</td><td></td></tr>
<tr><td>INSULATION and other material other than SARKING-TYPE MATERIAL</td><td></td></tr>
<tr><td>Fixed seating and a proscenium curtain in an Assembly Building</td><td>Specification H1.3 in the Building Code of Australia, Volume 1</td></tr>
</table>

Fire safety standards for FIRE HAZARD PROPERTIES must comply with Specification C1.10 Fire Hazard Properties in the Building Code of Australia, Volume 1:

The FIRE HAZARD PROPERTIES for (d), (e), (f), and (g) must be determined in accordance with testing procedures contained in Specification A2.4 Fire Hazard Properties in the Building Code of Australia Volume 1.

Exemptions to the above requirements are listed in Section C2.B.2.

.2 The following materials are exempt from Section C2.B.1 above and are not required to comply with FIRE HAZARD and/or FIRE RESISTANCE requirements:

(a) plaster, cement render, concrete, terrazzo, ceramic tile or the like

(b) a FIRE PROTECTIVE COVERING

(c) a timber-framed window

(d) a solid timber HANDRAIL or skirting

(e) a timber-faced solid-core door or timber-faced FIRE DOOR

(f) an electrical switch, socket, outlet, cover plate or the like

(g) material used for
(i) roof insulating material applied in continuous contact with a substrate, or
(ii) an adhesive, or
(iii) a damp-proof course, flashing, caulking, sealing, ground moisture barrier, or the like

(h) paint, varnish, lacquer or similar finish other than nitrocellulose lacquer

(i) clear or translucent ROOFLIGHT of glass fibre-reinforced polyester if:
(i) the roof in which it is installed forms part of a single STOREY BUILDING required to be Type C Construction
(ii) the material is used as part of the roof covering
(iii) it is not closer than 1.5 m from another ROOFLIGHT of the same type
(iv) each ROOFLIGHT is not more than 14 m^2 in area
(v) the area of the ROOFLIGHT per 70 m^2 of roof surface is not more than 14 m^2

(j) a face plate or neck adapter of supply and return air outlets of an air handling system

(k) a face plate or diffuser plate of light fitting and EMERGENCY EXIT signs and associated electrical WIRING and components

(l) a joinery unit, cupboard, shelving or the like

(m) an attached non-building fixture and fitting such as:
(i) a curtain, blind, or similar decor, other than a proscenium curtain required by Specification H1.3 of the Building Code of Australia, Volume 1
(ii) a whiteboard, window treatment or the like

(n) any other material that does not significantly increase the FIRE HAZARD

.3 For **Single Unit Residential** and related FACILITIES, the FIRE HAZARD properties of BUILDING MATERIALS must ensure:

(a) SARKING-TYPE MATERIALS used in the roof have a FLAMMABILITY INDEX not greater than 5

(b) flexible ductwork used for the transfer of products initiating from a heat source that contains a flame must comply with the FIRE HAZARD properties set out in AS 4254 Parts 1 and 2

(a) consist of either single or multiple panels attached by steel connections to lateral supporting members

C2.C Fire Curtains and Fire Shutters

.1 FIRE CURTAINS and FIRE SHUTTERS used to protect openings and resist the spread of fire must be automatically activated by fire alarms, fire detectors or other components of the FIRE SAFETY SYSTEM.

.2 A gravity fail safe system in which the FIRE CURTAIN or FIRE SHUTTER will descend under its own weight in the event of a power failure or other system failure must be part of the mechanism.

..3 Material for FIRE CURTAINS and FIRE SHUTTERS must be lightweight and have the appropriate FRL.

.4 If a metallic FIRE CURTAIN or FIRE SHUTTER is appropriate for the opening and BUILDING FUNCTION, it must comply with AS/NZS 1905.2

.5 FIRE CURTAINS and FIRE SHUTTERS must be appropriately sized and installed so that the opening is sufficiently sealed to prevent the spread of fire.

ACCEPTABLE SOLUTIONS

AS 4254: 2002 Parts 1 and 2 Ductwork for Air Handling Systems in Buildings

AS/NZS 1530.2: 1993 Method for Fire Tests on Building Materials
AS/NZS 1530.3: 1999 Methods for Fire Tests on Buildings
AS/NZS 1905.2: 1905 Components for the Protection of Openings in Fire-Resistant Walls - Fire Resistant Roller Shutters
AS/NZS 3837: 1998 Method of Test for Heat and Smoke Release Rates for Materials Using an Oxygen Consumption Calorimeter

AS ISO 9239.1: 2003 Reaction to Fire Tests for Floor Coverings
AS ISO 9705: 2003 Fire Tests - Full Scale Room Test for Surface Products

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

Building Code of Australia, Volume 1
- Specification A2.4 Determining Fire Hazard Properties, Group Number and Smoke Growth Rate Index
- Specification C1.10 Fire Hazard Properties
- Specification C1.11 Performance of External Walls in Fire
- Specification H1.3 Construction of Theatres with Proscenium Walls
- Verification Method CV1 Building Setback Based on Heat Flux

NFPA 80A: 2007 Recommended Practice for Protection of Buildings from Exterior Fire Exposure

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Construction details must show appropriate BUILDING SETBACKS, that requirements of FIRE HAZARD properties for linings, materials and assemblies are satisfied by listing appropriate materials, product summaries and specifications

C3 Fire Compartments

REQUIRED PERFORMANCE

.1 All structures in BUILDING GROUP 1-2, and **Communal Residential, Multiple Unit Residential, Assembly, Office/Commercial, Mixed Use** and **Industrial/Storage Buildings** in BUILDING GROUP 3 must reduce the potential for the spread of fire by sub-dividing BUILDINGS into two or more FIRE COMPARTMENTS separated from one another by walls, floors and/or ceilings made of FIRE-RESISTING construction appropriate to the size, use and configuration of the BUILDING.

.2 Size, location and configuration of FIRE COMPARTMENTS must be appropriate to:

(a) scale, massing, location and use of the BUILDING

(b) structural DURABILITY and load path

(c) FIRE LOAD and expected fire severity

(d) availability of a COMPLIANT SPRINKLER SYSTEM and other components of a FIRE SAFETY SYSTEM

(e) proximity of other BUILDINGS on site and adjacent property and their occupancy

(f) allowing safe evacuation to a PLACE of SAFETY or other FIRE COMPARTMENT

(g) allowing safe access for EMERGENCY RESPONDERS

.3 Adjoining UNITS in a **Multiple Unit Building** must be separated by a FIRE WALL that resists the spread of fire appropriate to the configuration, materials and details of the communal roof and EXTERNAL WALLS.

.4 Multiple-storey BUILDINGS that are required to have two or more FIRE COMPARTMENTS must be separated vertically by floors and ceilings with appropriate FIRE-RESISTING CONSTRUCTION.

.5 Where a FIRE WALL separates UNITS with different FRL (FIRE RESISTANCE LEVEL) requirements, the FIRE WALL must be constructed according to the greater FRL.

.6 Classrooms in **Schools** must be separated by FIRE WALLS regardless of the size and configuration of the FIRE COMPARTMENTS.

DEEMED-TO-SATISFY PROVISIONS

C3.A Maximum Size Of Fire Compartments

.1 The size of a FIRE COMPARTMENT or ATRIUM in a non-residential BUILDING must not exceed the relevant maximum GROSS FLOOR AREA nor the relevant maximum volume set out in Table C3.A.1.

.2 Calculations for FIRE COMPARTMENT size must take into account the following exemptions:

(a) a part of a BUILDING which contains only heating, ventilating, lift equipment, water tanks, or similar equipment is not counted in the GROSS FLOOR AREA or volume of a FIRE COMPARTMENT or ATRIUM if it is situated at the top of the BUILDING

(b) the part of an ATRIUM well bounded by the openings in the floors and extending from the level of the first floor above the ATRIUM to the roof covering is not counted in the volume of the ATRIUM for the purposes of this clause

Table C3.A.1: Maximum Size of Fire Compartments or Atria

Building Group	Building Type	Maximum	Construction Type A	Construction Type B	Construction Type C
1-4	**office**, **assembly**	GROSS FLOOR AREA	8,000 m^2	5,500 m^2	3,000 m^2
		Volume	48,000 m^3	33,000 m^3	18,000 m^3
1-4	**commercial, carpark, storage, industrial**	GROSS FLOOR AREA	5,000 m^2	3,500 m^2	2,000 m^2
		Volume	30,000 m^3	21,000 m^3	12,000 m^3
1-4	**health-care schools**	GROSS FLOOR AREA	2,000 m^2	2,000 m^2	2,000 m^2
1-4	**aged-care**	GROSS FLOOR AREA	500 m^2	500 m^2	500 m^2

Additional requirements for Large-Isolated Buildings, HEALTH-CARE and AGED-CARE BUILDINGS are set out in Sections C3.B to C3.D below.

See Section C5.C for a definition of Construction Type A, B and C

C3.B Fire Compartments in Large-Isolated Buildings

.1 Except for **Health-Care** and **Aged-Care Buildings**, the size of a FIRE COMPARTMENT in a LARGE-ISOLATED BUILDING may exceed that specified in Table C3.A.1 if the following criteria for the number of STOREYS, size, use of a COMPLIANT SPRINKLER SYSTEM, and provision of open space and vehicular access around the perimeter of the BUILDING are met:

(a) the BUILDING does not exceed 18,000 m^2 in GROSS FLOOR AREA nor exceed 108,000 m^3 in volume and:

(i) **Carpark**, **Storage, Industrial Buildings** only
(A) BUILDING contains not more than 2 STOREYS
(B) provides open space complying with C3.B.2 below not less than 18 m wide around the BUILDING
(ii) All BUILDINGS in Table C3.A.1:
(A) protected throughout with a COMPLIANT SPRINKLER SYSTEM
(B) provided with a perimeter vehicular access complying with C3.B.2 below
(iii) there is more than one BUILDING on the property and:
(A) each BUILDING complies with (i) or (ii) above, or
(B) if the BUILDINGS are closer than 6 m to each other they are regarded as one BUILDING and collectively comply with (i) or (ii) above

.2 For LARGE-ISOLATED BUILDINGS, open space / vehicular access must completely surround EXTERNAL WALLS to provide sufficient cleared area for EMERGENCY RESPONDERS to perform firefighting and rescue operations. The open space / vehicular access must:

(a) be wholly within the property except if the open space consists of a road or public place on adjacent property

(b) be capable of providing continuous access for emergency vehicles to enable travel in a forward direction from a public road around all EXTERNAL WALLS

(c) have a minimum unobstructed width of 6 m width and 6 m HEIGHT with no part of its furthest boundary more than 18 m from the BUILDING

(d) have a LOAD-BEARING capacity to permit the operation and passage of EMERGENCY RESPONDER vehicles

(e) not be built upon or used for the storage or processing of materials, products or other substances, except for the following uses providing they do not unduly impede fire-fighting or add to the risk of spread of fire to any BUILDING on SITE or on an adjoining property:
  - (i) guard houses for site security
  - (ii) SITE SERVICING structures (such as electricity substations and pump houses)
  - (iii) MINOR STRUCTURES

(f) not contain large trees and/or SITEWORKS that could interfere with firefighting and rescue operations

C3.C Fire Compartments In Health-Care Buildings

.1 A **Health-Care Building** that has treatment areas, wards and over-night accommodation must comply with the following to reduce the spread of fire:

(a) patient care areas must be divided into FIRE COMPARTMENTS not exceeding 2,000 m^2

(b) a FIRE COMPARTMENT must be separated from the remainder of the BUILDING by FIRE WALLS and:
  - (i) in Type A construction (see Section C5.C) - floors and roof or ceiling as required in Section C5.D of the NBC
  - (ii) in Type B construction (see Section C5.C) - floors with a FRL of not less than 120/120/120 and with the openings in EXTERNAL WALLS bounding patient care areas being vertically separated in accordance with the requirements of Section C5.D as constructed to the standards of Type A construction.

(c) Ward Areas
  - (i) where the GROSS FLOOR AREA exceeds 1,000 m^2, it must be divided into FIRE COMPARTMENTS not more than 1,000 m^2 by walls with an FRL of not less than 60/60/60
  - (ii) where the GROSS FLOOR AREA exceeds 500 m^2, it must be divided into FIRE COMPARTMENTS not more than 500 m^2 by SMOKE-PROOF walls complying with Specification C2.5 of the Building Code of Australia
  - (iii) where the GROSS FLOOR AREA is not more than 500 m^2, it must be separated from the remainder of the patient care area by SMOKE-PROOF walls complying with Specification C2.5 of the Building Code of Australia
  - (iv) where division of ward areas by FIRE-RESISTING walls under (a) or (c)(i) above is not required, any SMOKE-PROOF wall required under (c)(ii) or (iii) must have an FRL of not less than 60/60/60

(d) Treatment Areas
  - (i) where the GROSS FLOOR AREA exceeds 1,000 m^2, it must be divided into FIRE COMPARTMENTS not more than 1,000 m^2 by SMOKE-PROOF walls complying with Specification C2.5 of the Building Code of Australia
  - (ii) where the GROSS FLOOR AREA is not more than 1,000 m^{2,} it must be separated from the remainder of the patient care area by SMOKE-PROOF walls complying with Specification C2.5 of the Building Code of Australia

(e) any room or area located within a patient care area containing equipment or materials that have a high potential to be a FIRE HAZARD must be separated from the remainder of the patient care area by walls with a FRL of not less than 60/60/60, and they must extend to the underside of:
  - (i) the floor above, or
  - (ii) a NON-COMBUSTIBLE roof covering, or

(iii) a ceiling having a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above itself of not less than 60 minutes

(f) the room / areas referred to in (e) above include, but are not limited to, the following:
- (i) a kitchen and food preparation areas having a combined GROSS FLOOR AREA of more than 30 m^2
- (ii) a room containing a hyperbaric chamber (pressure chamber)
- (iii) a room used predominantly for the storage of medical records having a GROSS FLOOR AREA of more than 10 m^2
- (v) a laundry, where items of equipment are potential fire sources (e.g. gas fire dryers)

(g) openings in walls in Ward Areas (see (c) above) and Treatment Areas (see (d) above) required to have a FRL must be protected as follows:
- (i) doorways - SELF-CLOSING or AUTOMATIC FIRE DOOR with a FRL of /-60/30
- (ii) windows
  - (A) AUTOMATIC or permanently fixed closed with a FRL of –/60/–
  - (B) FIRE WINDOWS or FIRE SHUTTERS with a FRL of –/60/–
- (iii) other openings—must have an FRL not less than –/60/–

.2 FIRE COMPARTMENTS and separation of PUBLIC CORRIDORS must comply with Specification C2.5 Smoke-Proof Walls in the Building Code of Australia, Volume 1.

C3.D Fire Compartments In Aged-Care Buildings

.1 An **Aged-Care Building** that has treatment areas, wards and over-night accommodation must comply with the following to reduce the spread of fire:

(a) BUILDING must be divided into areas not more than 500 m^2 by SMOKE-PROOF FIRE WALLS complying with Specification C2.5 in the Building Code of Australia and Section C3.F Fire Walls of the NBC

(b) a FIRE COMPARTMENT must be separated from the remainder of the BUILDING by FIRE WALLS and, notwithstanding Section C3.B Fire Walls and Table C5.D for floors, have a FRL of not less than 60/60/60

(c) INTERIOR WALLS (other than those bounding lifts and stairways) supported by floors provided in accordance with (b) above need not comply with Table C5.D if they have an FRL not less than 60/–/–

(d) if the following contains equipment or materials with a high FIRE HAZARD potential) they must be separated from other parts of the BUILDING by SMOKE-PROOF walls complying with Specification C2.5 of the Building Code of Australia:
- (i) a kitchen and related food preparation areas having a combined floor area of more than 30 m2
- (ii) a laundry, where items of equipment are of the type that are potential fire sources (e.g. gas fired dryers)
- (iii) storage rooms greater than 10 m^2 used predominantly for the storage of administrative records

(e) openings in FIRE WALLS must be protected as follows:
- (i) doorways - SELF-CLOSING or AUTOMATIC FIRE DOOR with a FRL of /-60/30
- (ii) windows
  - (A) AUTOMATIC or permanently closed with a FRL of –/60/–
  - (B) FIRE WINDOWs or FIRE SHUTTERS with a FRL of –/60/–
- (iii) other openings—must have an FRL not less than –/60/–

.2 FIRE COMPARTMENTS and separation of PUBLIC CORRIDORS must comply with Specification C2.5 Smoke-Proof Walls in the Building Code of Australia, Volume 1.

C3.E Fire Compartments in Multiple Unit Buildings

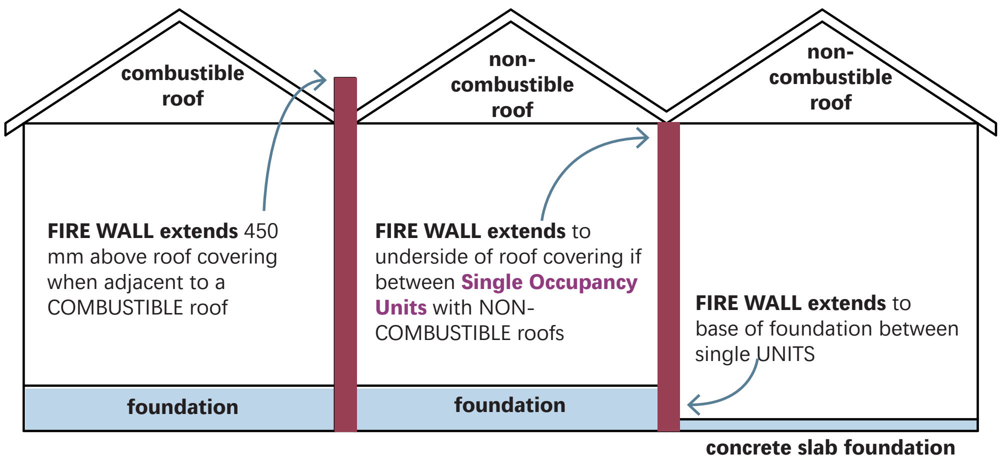
.1 **Multiple Unit Buildings** in BUILDING GROUP 1-4 must be divided into FIRE COMPARTMENTS horizontally if located on a single STOREY and vertically if there are multiple STOREYS according to the maximum size requirements in Section C3.A.

.2 A PUBLIC CORRIDOR in a **Multiple Unit Buildings, Health-Care** and **Aged-Care Buildings,** if more than 40 m in length, must be divided at intervals of not more than 40 m with SMOKE-PROOF walls complying with Clause 2 of Specification C2.5 Smoke-Proof Walls in the Building Code of Australia, Volume 1.

C3.F Fire Walls

.1 FIRE WALLS that separate adjoining FIRE COMPARTMENTS must have the following characteristics:

Figure C3.F.1: Fire Walls between Adjoining Units



(a) FIRE WALLS must be AIRTIGHT (as illustrated in Figure C3.F.1) and:
- (i) extend 450 mm above the roof covering if adjacent to a UNIT with a COMBUSTIBLE roof
- (ii) FIRE WALL need not extend further than the underside of the roof covering between two adjacent UNITS with NON-COMBUSTIBLE roofs
- (iii) extend to the base of lowest foundation between adjacent UNITS

(b) FIRE WALLS must have the appropriate FRL as shown in Table C5.D of the NBC for each of the adjoining parts, and if the FRL for each adjacent UNIT is different, the greater FRL must be used for all parts of the FIRE WALL (except where Table C5.D permits a lower FRL on the side of a **Carpark**)

(c) FIRE WALLS must not have any openings, or have openings that do not reduce the required FRL listed in Table C5.D of the NBC

(d) FIRE WALLS must not be penetrated by any BUILDING ELEMENTS, other than roof battens with dimensions of 75 mm x 50 mm or less or SARKING-TYPE MATERIAL, unless the required FIRE RESISTING performance of the FIRE WALL is maintained

(e) any gap between the FIRE WALL and masonry veneer must have a maximum distance of 50 mm, and must be packed with suitable FIRE RESISTANT material and satisfy WATERPROOFING requirements

.2 A part of a BUILDING separated from the remainder of the BUILDING by a FIRE WALL may be treated as a separate BUILDING if it is constructed in accordance with C3.F.1 above, and the following:

(a) the FIRE WALL extends through all STOREYS and spaces that are common to that part and any adjoining part of the BUILDING

(b) the FIRE WALL is carried through to the underside of the roof covering

(c) where the roof of one of the adjoining parts is lower than the roof of the other part, the FIRE WALL extends to the underside of:
- (i) the covering of the higher roof, or not less than 6 m above the covering of the lower roof, or
- (ii) the lower roof if it has an FRL not less than that of the FIRE WALL and no openings closer than 3 m to any wall above the lower roof, or
- (iii) the lower roof if its covering is NON-COMBUSTIBLE and the lower part has a COMPLIANT SPRINKLER SYSTEM

.3 Finishes on walls that adjoin a FIRE WALL must be NON-COMBUSTIBLE for at least 1.2 m extending from the intersection with the FIRE WALL.

.4 Regardless of whether a **Multiple Unit Building** is divided into FIRE COMPARTMENTS according to Section C3, a FIRE WALL must be constructed between adjacent UNITS to resist the spread of fire.

.5 The FIRE RESISTANCE of the FIRE WALL (see Section C4 and C5) separating different UNITS must be the higher of the requirement for each UNIT based on:

(a) BUILDING FUNCTION

(b) occupancy

C3.G Doorways in Fire Walls (Other than Horizontal Exits)

.1 All doors in a FIRE WALL must be a FIRE DOOR that complies with Section C4.D and Section D of the NBC, and has a minimum FRL of -/60/30,.

.2 The aggregate width of openings for doorways in a FIRE WALL, which are not part of a HORIZONTAL EXIT, must not exceed 1/2 of the length of the FIREWALL.

.3 Each doorway in a FIRE WALL must be protected by two FIRE DOORS, two FIRE SHUTTERS, or a FIRE DOOR / FIRE SHUTTER combination, one on each side of the doorway, each with a FRL of not less than 1/2 that required in Table C5.D of the NBC for the FIRE WALL except each door or shutter must also have an INSULATION level of at least 30.

.4 If a doorway in a FIRE WALL is fitted with a sliding FIRE DOOR which is open when the BUILDING is in use:

(a) it must be held open with an electromagnetic device, which when de-activated in accordance with (e) and (f) below allows the door to be fully closed 20 to 30 seconds after release

(b) in the event of power failure to the door - the door must fail safe in the closed position in accordance with (a) above

(c) an audible warning device must be located near the doorway and a red flashing warning light of adequate intensity on each side of the doorway must be activated in accordance with (e) and (f) below

(d) signs must be installed on each side of the doorway located directly over the opening stating in capital letters not less than 50 mm high in a colour contrasting with the background:

WARNING - SLIDING FIRE DOOR

(e) the electromagnetic device must be de-activated and the warning system activated by heat or SMOKE DETECTORS, as appropriate, and installed in accordance with AS/NZS 1905.1 and AS/NZS 1670.1

(f) where any other required suitable fire alarm system, including a COMPLIANT SPRINKLER SYSTEM is installed in the BUILDING, activation in either FIRE COMPARTMENT separated by the FIRE WALL must also de-activate the electromagnetic device and activate the warning system

C3.H Horizontal Exits In Firewalls

.1 All doors part of a HORIZONTAL EXIT must be FIRE DOORS that comply with Section C4.D and Section D of the NBC.

.2 A HORIZONTAL EXIT must consist of:

(a) a single FIRE DOOR that has an FRL of not less than that required by Section C5.D for the FIRE WALL and an INSULATION level of at least 30, or

(b) for a **Carpark, Storage**, or **Industrial Building** - 2 FIRE DOORS, one on each side of the doorway, each with an FRL of not less than ½ that required by Section C5.D for the FIRE WALL and an INSULATION level of at least 30

.3 HORIZONTAL EXITS may only be used if:

(a) they have a clear area on both sides of the FIRE WALL that can accommodate safe evacuation of people at a rate of:
(i) 0.5 m^2 per person, or
(ii) 2.5 m^2 per person in a **Health-Care** or **Aged-Care Building**

and the clear area is directly connected to a nearby EXIT

(b) the clear area required by (a) above can accommodate all occupants from the FIRE COMPARTMENT being evacuated if the FIRE COMPARTMENT has only two EXITS and one of them is a HORIZONTAL EXIT

(c) the clear area required by (a) above is connected to the HORIZONTAL EXIT by an unobstructed path

(d) the FIRE DOOR in the HORIZONTAL EXIT is able to be opened on both sides, and/or it must be automatically opened when triggered by an emergency, and must remain open until manually reset after the emergency is over

C3.I Openings (other than doors) In External Walls

.1 To reduce the spread of fire and smoke between FIRE COMPARTMENTS, the distance between openings in EXTERNAL WALLS in different FIRE COMPARTMENTS separated by a FIRE WALL must not be less than that set out in Table C3.I.1 and illustrated in Figure C3.I.1, unless:

(a) those parts of each EXTERNAL WALL between the openings have an FRL not less than 60/60/60

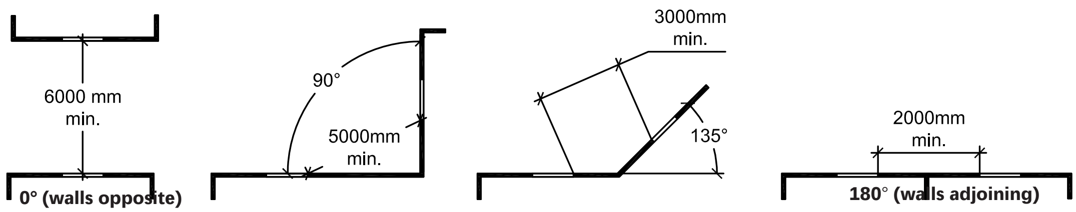
(b) any openings comply with provisions in Section C6 Protection of Service Openings in the NBC

.2 Use of in-window, through-wall, or through-floor air conditioning or ventilating must not be used in FIRE WALLS that separate adjoining **Single Occupancy Units**.

Table C3.E.1: Distance Between External Walls and Openings in Different Fire Compartments

ANGLE BETWEEN WALLS	MINIMUM DISTANCE
0° (walls opposite)	6000 mm
>0° to 45°	5000 mm
> 45° to 90°	4000 mm
> 90° to 135°	3000 mm
>135° to <180°	2000 mm
180° or more	Nil

Figure C3.E.1: Distance Between External Walls and Openings in Different Fire Compartments



ACCEPTABLE SOLUTIONS

AS/NZS 1668 Part 1: 1998 Fire and Smoke Control in Multi-Compartment Buildings
AS/NZS 1670.1: 2004 Fire Detection, Warning, Control and Intercom Systems
AS/NZS 1905.1: 1997 Components for the Protection of Openings in Fire-Resistant Walls
AS/NZS 3013: 2005 Electrical Systems: Classification of Fire and Mechanical Performance of Wiring Systems

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

Building Code of Australia, Volume1
 Specification C1.1 Fire-Resisting Construction
 Specification C1.11 Performance of External Walls in Fire
 Specification C2.5 Smoke-Proof Walls in Health-Care and Aged-Care Buildings
 Specification C3.4 Fire Doors,Smoke Doors, Fire Windows and Shutters
 Specification E1.5 Fire Sprinkler Systems

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Construction details showing location, construction material, and FRL for FIRE COMPARTMENTs and FIRE WALLS, and any other fire separation necessary

C4 Evacuation Route

REQUIRED PERFORMANCE

.1 The following must have a safe EVACUATION ROUTE, consisting of FIRE-ISOLATED PASSAGEWAYS, STAIRWAYS and RAMPS, EMERGENCY EXITS, and SMOKE LOBBIES, where appropriate, for occupants and EMERGENCY RESPONDERS in the event of an emergency:

(a) all BUILDINGS in BUILDING GROUP 1-3

(b) any other BUILDING, FACILITY or activities on SITE (deemed appropriate by the Government of Samoa)

.2 The EVACUATION ROUTE must lead to one or more PLACES OF SAFETY either outside or inside the BUILDING, and have a low probability of people being unreasonably delayed inside a BUILDING, impeded from moving to a PLACE OF SAFETY, or injured during evacuation.

.3 Placement and configuration of all parts of the EVACUATION ROUTE must consider EVACUATION TIME, location of EXITS, and location of PLACES OF SAFETY relative to:

(a) the number, mobility and characteristics of the occupants

(b) function or use of the BUILDING, layout, configuration, massing, siting, and number of STOREYS

(c) FIRE LOAD

(d) potential FIRE INTENSITY

(e) FIRE HAZARD

(f) FIRE SAFETY SYSTEM

(g) EMERGENCY RESPONDER resources and capabilities

.4 All BUILDING ELEMENTS, BUILDING MATERIALS, ASSEMBLIES and FINISHES in an EVACUATION ROUTE must have sufficient strength and FIRE RESISTANCE to remain intact and perform its intended safe evacuation function during an emergency for the length of time associated with the FRL.

.5 The EVACUATION ROUTE must be designed and constructed with regard to the likelihood and consequences of failure of any part of the FIRE SAFETY SYSTEM inside the BUILDING or FACILITY.

.6 Visibility in all parts of the EVACUATION ROUTE after failure of the main lighting must be maintained for the length of time associated with the FRL, and contain markings and signage to direct occupants of all abilities to an EXIT or PLACE OF SAFETY.

.7 Evacuation of **Residential Buildings** in BUILDING GROUP 5 must be accommodated by appropriately placed windows, doors, stairways and ramps that allow easy passage to the exterior.

C4.A Components and Layout

.1 Components within an EVACUATION ROUTE must consist of:

(a) FIRE-ISOLATED PASSAGEWAY - a PUBLIC CORRIDOR constructed with a FRL sufficient to ensure occupants can safely leave the BUILDING or reach a PLACE OF SAFETY

(b) EMERGENCY EXIT - a doorway on the EXTERNAL WALL of a BUILDING fitted with a SELF-CLOSING FIRE DOOR that connects to a FIRE-ISOLATED PASSAGEWAY or outdoor PLACE OF SAFETY

(c) PLACE OF SAFETY - a location where occupants can safely gather before exiting the SITE

.2 Additional components of an EVACUATION ROUTE that may be required based on the structure, massing, number of STOREYS, layout, function and use of the BUILDING include:

(a) FIRE-ISOLATED STAIRWAY - where a BUILDING is greater than one STOREY, or the entire structure is accessed by an enclosed stairway

(b) FIRE-ISOLATED RAMP - in **Health-Care** and **Aged-Care** BUILDINGS to allow safe egress for a PERSON WITH A DISABILITY, or any other BUILDING where appropriate

(c) EMERGENCY LIFT and FIRE-ISOLATED SHAFT - where needed in TALL BUILDINGS and intended for use by EMERGENCY RESPONDERS only

(d) SMOKE LOBBY - where protection from smoke accumulation is necessary, see Section C4.I

(e) FIRE WINDOW - if a window is placed in an EVACUATION ROUTE, it must be a FIRE WINDOW, see Section C7.O

(f) FIRE DOOR - to protect the EVACUATION ROUTE from the spread of fire

(g) SMOKE DOOR - to protect the EVACUATION ROUTE from the spread of smoke

(h) FIRE SHUTTERS - where needed to protect the EVACUATION ROUTE from the spread of fire, see Section C2.E

(i) HORIZONTAL EXIT - where needed to provide access to an adjacent FIRE COMPARTMENT, see Section C3.H

.3 Openings (windows and doors) in an EVACUATION ROUTE must be limited to only those necessary to allow egress from occupied areas of the BUILDING or FACILITY. If a window is deemed necessary for safety reasons, it must be constructed as a FIRE WINDOW and comply with Section C7.O of the NBC.

.4 Doors opening into an EVACUATION ROUTE must be FIRE DOORS with an FRL OF –/60/30. Doors within the EVACUATION ROUTE must be FIRE DOORS or SMOKE DOORS appropriate to the structure, scale, massing and use of the BUILDING, and the FIRE SAFETY SYSTEM.

.5 A window in an EXTERNAL WALL of an EVACUATION ROUTE must be protected in accordance with C4.C if it is within 6 m of, and exposed to, a window or other opening in a wall of the same BUILDING, other than in the same FIRE-ISOLATED PASSAGEWAY, STAIRWAY, or RAMP.

.6 A ramp must be provided in the EVACUATION ROUTE in **Health-Care**, **Aged-Care** and **Assembly Buildings** to accommodate a PERSON WITH A DISABILITY.

.7 BUILDINGS or other structures with an EVACUATION ROUTE must have either:

(a) a single FIRE-ISOLATED PASSAGEWAY, STAIRWAY or RAMP connected to an EMERGENCY EXIT where the number of occupants, BUILDING size and layout of rooms, EXITS and FIRE-ISOLATED STAIRWAYS are such that all occupants would be able to evacuate safely, or

(b) more than one FIRE-ISOLATED PASSAGEWAY, STAIRWAY or RAMP connected to an EMERGENCY EXIT based on the number of occupants, BUILDING size and layout of rooms, that are significantly removed from one another so that if one EMERGENCY EXIT route is blocked by fire or smoke, employees can evacuate using an alternate

.8 .Where an EVACUATION ROUTE does not provide a choice of travel in different directions to alternative EXITS and is along an open balcony, landing or the like and passes an EXTERNAL WALL of another **Single Occupancy Unit**, or a room not within a **Single Occupancy Unit**, then the EXTERNAL WALL must:

(a) be constructed of concrete or masonry, or be lined internally with a FIRE PROTECTIVE COVERING

(b) have any doorway fitted with a FIRE DOOR

(c) have any window be constructed as a FIRE WINDOW

.9 EMERGENCY EXITS must be installed with AUTOMATIC FIRE DOORS in accordance with the relevant provisions of AS 1670.1 if:

(a) SMOKE DETECTORS are unsuitable for the BUILDING or FACILITY

(b) located not more than 1.5 m horizontal distance from a BUILDING EXIT

C4.B FRL and Structural Stability

.1 All components in an EVACUATION ROUTE must be constructed with an appropriate FRL to allow safe egress for occupants and EMERGENCY RESPONDERS for the intended amount of time.

.2 Structural stability of an EVACUATION ROUTE must be assured by:

(a) using BUILDING ELEMENTS with the appropriate FIRE RESISTANCE LEVEL as indicated in Table C5.D.1: FRL Minimums for Building Elements in the NBC

(b) using BUILDING MATERIALS with the appropriate FIRE RESISTANCE LEVEL as indicated in Table C5.E.1: FRL Minimums for Building Elements in the NBC

(c) using BUILDING ELEMENTS, BUILDING MATERIALS, and ASSEMBLIES that support the maximum permitted occupant load for each floor served as per AS 1170

.3 EXTERNAL WALLS located within 6m from an EMERGENCY EXIT must have:

(a) a FRL of 60/60/60

(b) any opening protected internally according to Section C6 for a distance of 3m above or below the level of the path of travel

C4.C Signage and Visibility

.1 The interior of an EVACUATION ROUTE must be clearly visible during normal operations, and in emergency situations (DISASTER) must operate in the event of failure of the main lighting system.

.2 The following components of an EVACUATION ROUTE must be made clearly visible:

(a) BUILDING ELEMENTS that may act as obstructions

(b) safety features such as HANDRAILS, ACCESSIBILITY aids, signs

(c) changes in direction

(d) stairs and ramps

(e) FIRE DOORS

(f) SMOKE DOORS

(g) EMERGENCY EXITS

(h) entries/EXITS to a PLACE OF SAFETY

.3 The above requirement (Section C4.C.2) does not apply to the initial 20m of an EVACUATION ROUTE if the risk of injury or impediment to movement of people is low (for example, the EVACUATION ROUTE is level, and people do not require assistance to escape).

.4 The systems for visibility must operate to the following percentages of their design levels within the following times after failure of the main lighting:

(a) 80% in 0.5 seconds in locations where there is a high risk of injury due to delay in operation of the systems for visibility

(b) 10% in 0.5 seconds, and 80% in 30 seconds, in stairs and in locations that are unfamiliar to users

(c) 10% in 20 seconds, and 80% in 60 seconds, in all other locations

.5 The following components of the EVACUATION ROUTE must be clearly marked by appropriate signage (in Samoan and English, or a suitable pictogram) or other appropriate means for a PERSON WITH A DISABILITY, and must operate upon the failure of the main lighting system:

(a) EMERGENCY EXITS

(b) FIRE DOORS and SMOKE DOORS

(c) entries to FIRE-ISOLATED STAIRWAYS, RAMPS and PASSAGEWAYS

(d) direction of egress in the EVACUATION ROUTE

(e) entries to HORIZONTAL EXITS

(f) entries to PLACES OF SAFETY

(g) EMERGENCY LIFTS (indicating that the use is for EMERGENCY RESPONDERS only)

C4.D Fire Doors

.1 FIRE DOORS in an EVACUATION ROUTE must:

(a) have the door open in the direction of exit, or have a transparent, FIRE-RESISTANT upper panel if constructed to open in both directions

(b) be SELF-CLOSING

(c) have the appropriate FRL as per Section C3.D of the NBC, and assembled to comply with AS 1905.1

(d) have a latching mechanism to prevent pressure caused by the build-up of fire from pushing the door open

(e) be ACCESSIBLE as per Section D Access in the NBC

(f) be effectively sealed between the door, door frame, and wall complying in AS 1530.7

.2 All FIRE DOORS must be readily openable without a key from the side that faces a person seeking egress in the EVACUATION ROUTE by a single hand pushing action on a device located between 900 mm and 1,100 mm from the FINISHED FLOOR and is ACCESSIBLE.

.3 A FIRE DOOR must be AUTOMATIC if deemed appropriate by the Government of Samoa because of the size, scale, occupancy and use of the BUILDING and/or FACILITY, and its operation must be triggered by fire alarms, SMOKE ALARMS or other components of the FIRE SAFETY SYSTEM

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.4 FIRE DOORS must comply with all provisions in Section D Access of the NBC.

.5 If a FIRE DOOR is intended to be automatically held open during an emergency situation, it must be equipped with an acceptable heat responsive device, fusible link or a SMOKE DETECTOR connected to the FIRE SAFETY SYSTEM.

.6 A FIRE DOOR that is double-door size must be free of an astragal that prevents free movement through the opening, and must be fully AUTOMATED and connected to the FIRE SAFETY SYSTEM.

.7 If a glazed panel in a FIRE DOOR is capable of being mistaken for an unobstructed EXIT, the glass must be identified by opaque construction (which could include an opaque mid-height band, mid-rail or crash bar) or other suitable method that differentiates it from a window and comply with Section H4 of the NBC.

.8 A FIRE DOOR must be purchased from a recognised, responsible manufacturer whose products conform to approved standards for fire safety appropriate to the scale, massing, occupancy and use of the BUILDING and/or FACILITY.

C4.E Smoke Doors

.1 A SMOKE DOOR must be ACCESSIBLE as per Section D Access in the NBC.

.2 To reduce the spread of smoke and harmful air-borne substances, SMOKE DOORS must be installed:

(a) as the only entries (other than lifts) to SMOKE LOBBIES

(b) as the access for each overnight accommodation UNIT in **Health-Care** and **Aged-Care Buildings**

(c) for each UNIT with egress to an enclosed PUBLIC CORRIDOR for **Communal Residential, Multiple Unit Buildings. Office/Commercial** and **Mixed Use Buildings,** and **Tourist Accommodation** in BUILDING GROUP 2

(d) in any other location deemed appropriate by the Government of Samoa relative to the scale, massing, occupancy and use of the BUILDING and/or FACILITY

.3 SMOKE DOORS must resist the passage of smoke from one side of the door to the other and:

(a) have an effective seal complying with the standards in AS 1530.7

(b) be capable of resisting smoke at 200°C for 30 minutes

(c) if they are glazed, have the GLAZING marked for visibility as per Section H4 in the NBC and be composed of FIRE RESISTANT. metal GLAZING bead > 6.5 mm

.4 A SMOKE DOOR of one or two leaves that are side-hung must be able to swing in the direction of egress, or in both directions.

.5 A SMOKE DOOR must be:

(a) SELF-CLOSING, or

(b) AUTOMATIC if deemed appropriate by the Government of Samoa because of the size, scale, occupancy and use of the BUILDING and/or FACILITY, and its operation must be triggered by AUTOMATIC FIRE ALARMS, SMOKE ALARMS or other components of the FIRE SAFETY SYSTEM

.6 If a glazed panel in a SMOKE DOOR is capable of being mistaken for an unobstructed EXIT, the glass must be identified by opaque construction (which could include an opaque mid-height band, mid-rail or crash bar) or other suitable method that differentiates it from a window and comply with Section H4 of the NBC..

C4.F Fire-Isolated Passageways

.1 To reduce the potential for the spread of fire and smoke, FIRE-ISOLATED PASSAGEWAYS must be designed as AIRTIGHT and have as few openings (windows, doors, service access, etc.) as possible.

.2 All structural members and INTERIOR WALLS of a FIRE-ISOLATED PASSAGEWAY must have the appropriate FRL as indicated in Table C5.D and Table C5.E of the NBC, and in any appropriate construction standards from Australia or New Zealand.

.3 Finishes within FIRE-ISOLATED PASSAGEWAYS must be NON-COMBUSTIBLE.

C4.G Fire-Isolated Stairways and Ramps

.1 FIRE-ISOLATED STAIRWAYS and RAMPS with an appropriate FRL are required as part of an EVACUATION ROUTE for the following:

(a) TALL BUILDINGS

(b) **Health-Care and Aged-Care Buildings** greater than two STOREYS

(c) open spectator stands where the stairway access is fully enclosed

(d) BUILDINGS or FACILITIES greater than 2 STOREYS in HEIGHT that store, use or manufacture HAZARDOUS SUBSTANCES

.2 FIRE-ISOLATED STAIRWAYS and RAMPS must have no direct connection to stairways and ramps that are not FIRE-ISOLATED.

.3 Any construction that separates, attaches to, or is common to a FIRE-ISOLATED STAIRWAY or RAMP must be:

(a) NON-COMBUSTIBLE

(b) SMOKE-PROOF in accordance with Clause 2 of Specification C2.5 Smoke-Proof Walls in Health-Care and Aged-Care Buildings in the Building Code of Australia, Volume 1.

.4 A FIRE-ISOLATED STAIRWAY OR RAMP that is ACCESSIBLE must have a clear width between HANDRAILS of a minimum of 1.2m unless it contains a COMPLIANT SPRINKLER SYSTEM.

.5 Finishes within FIRE-ISOLATED STAIRWAYS and RAMPS must be NON-COMBUSTIBLE.

.6 If more than 2 access doorways (other than from a SANITARY COMPARTMENT or the like) open to a FIRE-ISOLATED STAIRWAY or RAMP in the same STOREY, protection from the spread of fire must be provided by:

(a) a SMOKE LOBBY positioned adjacent to the FIRE-ISOLATED STAIRWAY or RAMP in accordance with Section C8.B of the NBC., and Specification D2.6 of the Building Code of Australia, Volume 1, or

(b) pressurising the FIRE-ISOLATED STAIRWAY or RAMP in accordance with AS/NZS 1668.1

.7 The space below a FIRE-ISOLATED STAIRWAY or RAMP must:

(a) not be enclosed to form a cupboard or the like if it is located within the FIRE-ISOLATED SHAFT, FIRE-ISOLATED STAIRWAY and/or FIRE-ISOLATED RAMP

(b) not be enclosed to form a cupboard or the like in a non FIRE-ISOLATED STAIRWAY and/or RAMP unless:
(i) the enclosing walls and ceilings have a FRL or 60/60/60
(ii) any access doorway to the enclosed space is fitted with a SELF-CLOSING -/60/30 FIRE DOOR

C4.H Places of Safety

.1 Every property in BUILDING GROUP 1-4 must have at least one designated PLACE OF SAFETY that acts as a holding area that occupants can migrate to in the case of a fire, DISASTER or other emergency affecting the property, and safely remain in until EMERGENCY RESPONDERS arrive or from which they can safely exit the property.

.2 An acceptable PLACE OF SAFETY must be identified in the FIRE SAFETY AND EVACUATION PLAN for the BUILDING, FACILITY and/or SITE, and must be one of the following :

outdoor

(a) road or open space sufficiently removed from the BUILDING, FACILITY and fire source that the collapse of the BUILDING or FACILITY would not cause harm to people in the PLACE OF SAFETY

(b) a covered area, including another BUILDING or FACILITY, that is sufficiently separated from the BUILDING or structure under fire,

indoor

(c) a part of a BUILDING or FACILITY used only for pedestrian movement, car parking or the like, that is open-sided for at least 2/3 of its perimeter

(d) a room in a separate FIRE COMPARTMENT that has a short-distance (< 20 m), FIRE-ISOLATED unimpeded path of travel to an EMERGENCY EXIT, and:
- (i) adjoins a road or open space
- (ii) has an unobstructed clear height throughout, including the perimeter openings, of 3 m or more

.3 A PLACE OF SAFETY must have the following characteristics:

(a) adequate protection from untenable conditions

(b) an appropriate communication system to contact EMERGENCY RESPONDERS

(c) adequate space for the intended number of occupants

(d) an unobstructed, ACCESSIBLE pedestrian connection to public property (such as a roadway, park, government BUILDING)

(e) more than one way that EMERGENCY RESPONDERS can access it and assist occupants to safely exit

(f) an FRL for structural adequacy of a minimum of 2 hours (except for outdoor PLACES OF SAFETY sufficiently removed from the BUILDING)

.4 If located outside, a PLACE OF SAFETY must be sufficiently distanced from potential fire sources so that fire or toxic substances from a BUILDING or FACILITY is unlikely to spread to it during normal and extreme weather events. It can be combined with a site amenity, such as an outdoor plaza, park, garden, etc., but it must be free of potentially dangerous situations regarding tripping HAZARDS, falling objects, uprooted trees, FLOODING, etc.

C4.I Smoke Lobby

.1 A SMOKE LOBBY must be constructed as part of an EVACUATION ROUTE if:

(a) the SMOKE CONTROL SYSTEM is not adequate to dissipate smoke from the EVACUATION ROUTE, specifically, the FIRE-ISOLATED STAIRWAY and RAMPS, and/or

(b) two or more doors (other than for SANITARY COMPARTMENTS) open onto a FIRE-ISOLATED PASSAGEWAY that is not pressurised

.2 A SMOKE LOBBY must:

(a) have a GROSS FLOOR AREA of not less than 6 m^2

(b) be placed adjacent to a FIRE-ISOLATED STAIRWAY, RAMP and/or elevator lobby, as the example illustrated in Figure C4.I.2

(c) be separated from the occupied areas in the STOREY by walls which are IMPERVIOUS to smoke

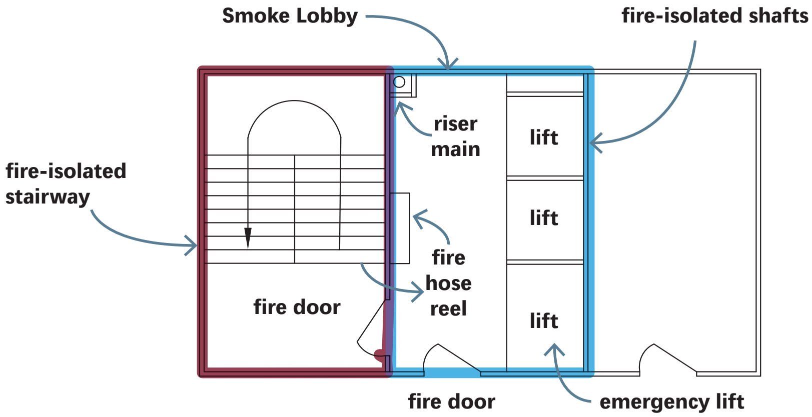
(d) have a FRL of 60/60/-, and consist of fire protective grade plasterboard, gypsum block with set plaster, face brickwork, glass block or GLAZING

(e) have fire protection that extends from slab to slab, or to the underside of a ceiling with a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of 60 minutes

(f) have any construction joints between the top of the walls and the floor sub, roof or ceiling be smoke sealed with intumescent putty or other suitable materials

(g) have SMOKE DOORS at any opening from occupied areas that comply with Clause 3 of Specification C3.4 Fire Doors, Smoke Doors, Fire Windows and Fire Shutters, in the Building Code of Australia, Volume 1, and have no doors providing direct access to the exterior of the BUILDING or FACILITY

Figure C4.I.2: Example of Fire-Isolated Stairway, Smoke Lobby and Fire Isolated Shafts



(h) be pressurised if the EVACUATION ROUTE is required to be pressurised under Section E2.2 of the Building Code of Australia, Volume 1

C4.J Site Servicing Penetrations In Evacuation Routes

.1 EVACUATION ROUTES must not be penetrated by any utilities, piping, PLUMBING, or the like, other than :

(a) ducting associated with a pressurisation system if it:
- (i) is constructed of materials having a FRL of not less than -/120/60 where it passes through any other part of the BUILDING
- (ii) does not open into any other part of the BUILDING

(b) water supply pipes for fire services

.2 Access to SITE SERVICING SHAFTS and PLUMBING, electrical or other utility other than for firefighting or detection equipment must not be provided in an EVACUATION ROUTE, including:

(a) any openings to a chute or duct intended to convey hot products of COMBUSTION from a boiler, incinerator, fireplace, or the like

(b) gas or other FUEL SUPPLY pipes

.3 Access to the following utilities and equipment in EVACUATION ROUTES is permitted if they are enclosed in NON-COMBUSTIBLE construction or have a FIRE PROTECTIVE COVERING with all openings suitably sealed:

(a) electricity meters, distribution boards or ducts

(b) central telecommunications distribution boards or equipment

(c) electrical motors or other motor servicing equipment in the BUILDING

.4 Electrical WIRING can be installed in a FIRE-ISOLATED PASSAGEWAY, FIRE-ISOLATED STAIRWAY, or FIRE-ISOLATED RAMP if the WIRING is associated with:

(a) a lighting, detection,or pressurisation system serving the EXIT, or

(b) a security, surveillance or management system serving the EXIT

(c) an intercommunication system or an audible or visual alarm system provided near the door with a sign fixed adjacent to such doors explaining its purpose and method of operation

(d) the monitoring or HYDRANT or sprinkler isolating valves

ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings
AS 1530.7: 2007 Methods for Fire Tests on Building Materials, Components and Structures, Part 7: Smoke Control Assemblies
AS 1905.1: 2005 Components for the Protection of Openings in Fire-Resistant Walls
AS 3745: 2010 Planning for Emergencies in Facilities
AS 6905: 2007 Smoke Doors

AS/NZS 1670.1: 2004 Fire Detection, Warning, Control and Intercom Systems

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

Building Code of Australia, Volume 1
Specification C2.5 Smoke-Proof Walls in Health-Care and Aged-Care Buildings
Specification C3.4 Fire Doors, Smoke Doors, Fire Windows and Shutters

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Construction Drawings must show and label EVACUATION ROUTE(S) and estimated evacuation time, FIRE-ISOLATED PASSAGEWAYS, STAIRWAYS, RAMPS, EXITS, and PLACES OF SAFETY

C5 Fire Resistance

REQUIRED PERFORMANCE

.1 All structures in BUILDING GROUPS 1-3, and **Industrial/Storage Buildings** in BUILDING GROUP 4 that store, handle or manufacture HAZARDOUS SUBSTANCES, must have sufficient FIRE RESISTANCE to maintain structural stability during a fire for a period of time sufficient for occupants to escape to a PLACE OF SAFETY, to ensure the safety of EMERGENCY RESPONDERS, and to avoid damage to other property. TEMPORARY STRUCTURES are exempt from requirements unless they house HAZARDOUS SUBSTANCES.

.2 **Single Unit Residential** in BUILDING GROUP 5, including MINOR STRUCTURES, are required to have EXTERNAL WALLS that are FIRE RESISTANT if the structures are placed close enough to the property line that there is a potential danger for the spread of fire from the BUILDING to another structure on an adjacent property.

.3 BUILDINGS required to be FIRE RESISTANT must have BUILDING ELEMENTS, BUILDING MATERIALS, finishes and coatings with an FRL appropriate to:

(a) the function and use of the BUILDING, and its proximity to adjacent property and structures

(b) the FIRE LOAD, potential FIRE INTENSITY and the FIRE HAZARD

(c) HEIGHT of the BUILDING

(d) any active FIRE SAFETY SYSTEM installed

(e) the size of any FIRE COMPARTMENT

(f) the EVACUATION TIME

(g) other stability and design requirements in the NBC

.4 An acceptable FRL must be attained for the following BUILDING ELEMENTS, where appropriate:

(a) walls (LOAD-BEARING, FIRE WALL, EXTERNAL and COMMON)

(b) structural columns, beams, girders and trusses

(c) FIRE DOORS, FIRE WINDOWS, FIRE CURTAINS and FIRE SHUTTERS

(d) uninsulated GLAZING

(e) air ducts, electric and PLUMBING fixtures, pipes, CONDUITS and control joints

(f) fire dampers and air transfer grille assemblies

(g) critical services (CURRENT-carrying CABLES and busways, fibre optic CABLES, data CABLES, communication systems, fire detection and alarm WIRING, HYDRANT systems, emergency control systems, any other service required to operate at some level in the event of a fire or DISASTER)

.5 Collapse of BUILDING ELEMENTS with lesser FIRE RESISTANCE must not cause the consequential collapse of BUILDING ELEMENTS that are required to have a higher FIRE RESISTANCE.

C5.A Criteria for Determining the FRL of Building Elements

.1 Where a BUILDING or FACILITY has different FRL requirements associated with different BUILDING FUNCTIONS on the same STOREY, each BUILDING ELEMENT on the STOREY must be designed with the higher FRL regardless of other requirements.

.2 Where the FRL of a BUILDING ELEMENT is determined based on the distance from the BUILDING ELEMENT to a fire-source feature:

(a) the entire BUILDING ELEMENT must have the FRL applicable to that part having the least distance between it and the relevant fire-source feature, or

(b) each part of the element must have the FRL applicable according to its individual distance from the relevant fire-source feature

.3 The FRL of a part of a BUILDING or FACILITY that gives direct vertical or lateral support to another part must:

(a) if located within the same FIRE COMPARTMENT as the part it supports have an FRL in respect of structural adequacy the greater of the supporting part itself, or the part it supports

(b) be NON-COMBUSTIBLE if required by other provisions of Section C, or

(c) be NON-COMBUSTIBLE if the part it supports is required to be NON-COMBUSTIBLE

(d) exceptions to the above:
- (i) an element providing lateral support to an EXTERNAL WALL if it complies with C2.C PERFORMANCE REQUIREMENTS for Concrete External Walls
- (ii) an element providing support within a **Carpark** complying with C5.G Fire-Resisting Construction for Carparks, C5.D, of the NBC and is of Type B or C construction
- (iii) a column providing lateral support to a wall where the column complies with C5.C.5
- (iv) an element providing lateral support to a FIRE WALL or FIRE-RESISTING wall provided the wall is supported on both sides and failure of the element on one side does not affect the fire performance of the wall

.4 In determining the appropriate FRL, a part of a BUILDING ELEMENT is considered to be exposed to a fire source if any of the horizontal straight lines between that part and the fire-source feature, or vertical projection of the feature, is not obstructed by another part that:

(a) has an FRL of not less than 30/–/–

(b) is neither transparent nor translucent

.5 In determining the appropriate FRL, a part of a BUILDING ELEMENT is considered not to be exposed to a fire-source feature if the fire-source feature is:

(a) an EXTERNAL WALL of another BUILDING that stands on the property and the part concerned is greater than 15 m above the highest part of the EXTERNAL WALL, or

(b) a side or rear boundary of the property and the part concerned is below the level of the finished ground at every relevant part of the boundary concerned

.6 Attachments to an EXTERNAL WALL with the required FRL (such as a sign, sunscreen, blind, awning or the like) may be COMBUSTIBLE (with no FIRE RESISTANCE rating) if:

(a) the material is exempted under Section C2.B Fire Hazard Properties for Linings, Materials and Assemblies in the NBC or complies with FIRE HAZARD properties in Specification C1.10 Fire Hazard Properties in the Building Code of Australia, Volume 1

(b) it is not located near or directly above an EMERGENCY EXIT

(c) it does not otherwise constitute an undue risk of fire spread via the EXTERNAL WALL of the BUILDING

.7 The attachment of a facing or finish, or the installation of ducting or PLUMBING, to a part of a BUILDING or FACILITY required to have an FRL must not impair the required FRL of that part.

.8 A NON-COMBUSTIBLE roof-top structure and/or equipment are exempt from having a FRL if it only contains:

(a) hot water or other water tanks

(b) ventilating ductwork, fans and motors

(c) air conditioning chillers

(d) window cleaning equipment

(e) other NON-COMBUSTIBLE equipment that does not contain COMBUSTIBLE liquids or gases

.9 A lintel is required to have an appropriate FRL if it contributes to the support of a FIRE DOOR, EMERGENCY EXIT, FIRE WINDOW, FIRE CURTAIN or FIRE SHUTTER, or if

(a) it spans an opening in a non load-bearing masonry EXTERNAL WALL that is greater than 3.0 m wide

(b) it spans an opening in a LOAD-BEARING masonry EXTERNAL WALL that is greater than 1.8 m wide

.10 A steel column, other than one in a FIRE WALL or COMMON WALL, need not have an FRL in a BUILDING that contains:

(a) only 1 STOREY, or

(b) 2 STOREYS in some of its parts and 1 STOREY in its remaining parts, and if the sum of the GROSS FLOOR AREA of the upper STOREYS of its 2 STOREY parts does not exceed 1/8 of the GROSS FLOOR AREA of the 1 STOREY parts

.11 A requirement for an EXTERNAL WALL to have an FRL does not apply to a CURTAIN WALL which is of NON-COMBUSTIBLE construction and fully protected by AUTOMATIC EXTERNAL WALL sprinklers.

.12 SHAFTS required to have an FRL must be enclosed at the top and bottom by construction with an FRL equal to or greater than the walls of a non load-bearing SHAFT, except that these provisions need not apply to:

(a) the top of a SHAFT extending beyond the roof covering, other than one enclosing a FIRE-ISOLATED STAIRWAY or FIRE-ISOLATED RAMP, or

(b) the bottom of a SHAFT if it is NON-COMBUSTIBLE and laid directly on the ground

13. Balconies, verandahs and the like having supporting columns of NON-COMBUSTIBLE construction need not have the required FRL in Section C4 and C5 of the NBC if they are not part of an EVACUATION ROUTE or path of travel to a BUILDING EXIT.

.14 If a BUILDING ELEMENT is required to have an FRL, LIGHTWEIGHT CONSTRUCTION can be used for the FIRE-RESISTING covering of a steel column if installed using a method and materials identical with a prototype of the construction that has achieved the required FRL or RESISTANCE TO THE INCIPIENT SPREAD OF FIRE.

C5.B Non-Combustible Materials

.1 The following materials, though COMBUSTIBLE or containing COMBUSTIBLE fibres, may be used wherever a NON-COMBUSTIBLE material is required for FIRE-RESISTING construction:

(a) plasterboard or fibrous-plaster sheet

(b) perforated gypsum lath with a normal paper finish

(c) fibre-reinforced cement sheeting

(d) pre-finished metal sheeting having a COMBUSTIBLE surface finish not exceeding 1 mm thick and where the SPREAD-OF-FLAME INDEX of the product is not more than 0

(e) bonded laminated materials where:
- (i) each laminate is NON-COMBUSTIBLE
- (ii) each adhesive layer is not more than 1 mm thick, total thickness not more than 2 mm
- (iii) the SPREAD-OF-FLAME INDEX and the SMOKE-DEVELOPED INDEX of the laminated material as a whole does not exceed 0 and 3 respectively

C5.C Construction Type A, B and C

.1 All BUILDINGS required to be FIRE RESISTANT (BUILDING GROUPS 1-3, and **Industrial/Storage Buildings** in BUILDING GROUP 4 that store, handle or manufacture HAZARDOUS SUBSTANCES), will be of Construction Type A, B, or C based on HEIGHT and function, as indicated in Table C5.C.1.

Table C5.C.1: Construction Type A, B or C according to Building Group and Number of Storeys

Storeys	Building Group 1	Building Group 2-3		Building Group 4 Industrial / Storage with HAZARDOUS SUBSTANCES only
		Health-Care, Aged Care, Assembly Residential, Tourist Accommodation	All Other Buildings	
4+	A	A	A	n.a.
3	A	A	B	A
2	A	B	C	B.
1	A	C	C	C.

Type A Construction = most FIRE-RESISTANT type of construction
Type B Construction = moderate degree of FIRE-RESISTANT construction
Type C Construction = least FIRE-RESISTANT type of construction

.2 Any BUILDING, FACILITY or SITE that stores, produces, dispenses or handles HAZARDOUS SUBSTANCES must be designed and constructed to the requirements of Section E Hazardous Substances, or according to Construction Type A, B, or C as indicated in Table C5.C.1 above, whichever is the most stringent and protective of the health and safety of people and the environment.

.3 A **Mixed Use Building** with a mix of Construction Types (A, B, or C) must be designed to the most FIRE-RESISTANT type of construction unless the uses are within different FIRE COMPARTMENTS or are otherwise physically separated.

C5.D Fire-Resisting Construction for Building Elements

.1 BUILDING ELEMENTS in structures required to be FIRE RESISTANT must have the minimum FRL indicated in Table C5.D.1 below, and comply with Specification C1.1 Fire-Resisting Construction in the Building Code of Australia, Volume 1, with the following exceptions:

(a) timber column may be used in a single STOREY BUILDING if:
- (i) in a FIRE WALL or COMMON WALL the column has a FRL not less than that listed in Table C5.D.1
- (ii) in any other case where the column is required to have an FRL in accordance with Table C5.D.1, it must be not less than 30/–/–

(b) a balcony, veranda, or the like, and any incorporated supporting part, which is attached to or forms part of a BUILDING, need not comply with Table C5.D.1 if:
- (i) it does not form part of the only path of travel to an EMERGENCY EXIT
- (ii) in Type A Construction:
  - (A) it is situated not more than 2 STOREYS above the lowest STOREY providing direct egress to a road or open space
  - (B) any supporting columns are of NON-COMBUSTIBLE material

Table C5.D.1: FRL Minimums for Building Elements
See Section C5.C for a description of Construction Type A, B and C

	Construction Type A	Construction Type B	Construction Type C
A EXTERNAL WALLS			
A1. BUILDING MATERIAL	NON-COMBUSTIBLE	NON-COMBUSTIBLE	Outer portion of EXTERNAL WALL only to be tested from the outside to satisfy the FRL requirement
A2. LOAD-BEARING FRL Requirement	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 90/60/60 >3 m from fire source 90/60/30 **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source 120/120/120 1.5 to 3 m from fire source 120/90/90 >3 m from fire source 120/60/30 **Retail** <1.5 m from fire source 180/180/180 1.5 to 3 m from fire source 180/180/120 >3 m from fire source 180/120/90 **Storage, Industrial** <1.5 m from fire source 240/240/240 1.5 to 3 m from fire source 240/240/180 >3 m from fire source 240/180/90	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source 90/90/90 1.5 to<3 m from fire source 90/60/30 3 m to <9 m from fire source 90/30/30 9 m to 18 m from fire source 90/30/- >18 m -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source 120/120/120 1.5 to<3 m from fire source 120/90/60 3 m to<9 m from fire source 120/30/30 9 m to<18 m from fire source 120/30/- >18 m -/-/- **Retail** <1.5 m from fire source 180/180/180 1.5 to<3 m from fire source 180/120/90 3m to <9 m from fire source 180/90/60 9 m to <18 m from fire source 180/60/- >18m -/-/- **Storage, Industrial** <1.5 m to fire source 240/240/240 1.5 to <3 m to fire source 240/180/120 3 m to <9 m to fire source 240/90/60 9 m to 18 m to fire source 240/60/- >18 m -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source -/-/- >3 m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/- **Retail** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/- **Storage, Industrial** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/-

	Construction Type A	Construction Type B	Construction Type C
A3. non load-bearing FRL Requirement	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source -/90/90 1.5 to 3 m from fire source -/60/60 >3 m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source -/120/120 1.5 to 3 m from fire source -/90/90 >3 m from fire source -/-/- **Retail** <1.5 m from fire source -/180/180 1.5 to 3 m from fire source -/180/120 >3 m from fire source -/-/- **Storage, Industrial** <1.5 m from fire source -/240/240 1.5 to 3 m from fire source -/240/180 >3 m from fire source -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source -/90/90 1.5 to 3 m from fire source -/60/30 > 3m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source -/120/120 1.5 to 3 m from fire source -/90/60 >3 m from fire source -/-/- **Retail** <1.5 m from fire source -/180/180 1.5 to 3 m from fire source -/120/90 >3 m from fire source -/-/- **Storage, Industrial** <1.5 m from fire source -/240/240 1.5 to 3 m from fire source -/180/120 >3 m from fire source -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source -/-/- >3 m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/- **Retail** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/- **Storage, Industrial** <1.5 m from fire source 90/90/90 1.5 to 3 m from fire source 60/60/60 >3 m from fire source -/-/-
A4. External Column LOAD-BEARING (separate from EXTERNAL WALL)	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/- *Applies also to those parts of an internal column that face and are within 1.5m of a window and are exposed through that window to a FIRE SOURCE*	**Tourist Accommodation, Multiple Unit + Communal Residential** <18 m from fire source 90/-/- >/= 18 m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <18 m from fire source 120/-/- >/= 18 m from fire source -/-/- **Retail** <18 m from fire source 180/-/- >/= 18 m from fire source -/-/- **Storage, Industrial** <18 m from fire source 240/-/- >/= 18 m from fire source -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** <1.5 m from fire source 90/-/- 1.5 to 3 m from fire source -/-/- >3 m from fire source -/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** <1.5 m from fire source 90/-/- 1.5 to 3 m from fire source 60/-/- >3 m from fire source -/-/- **Retail** <1.5 m from fire source 90/-/- 1.5 to 3 m from fire source 60/-/- >3 m from fire source -/-/- **Storage, Industrial** <1.5 m from fire source 90/-/- 1.5 to 3 m from fire source 60/-/- >3 m from fire source -/-/-
A5. External Column non load-bearing (separate from EXTERNAL WALL)	**All BUILDINGS** -/-/-	**All BUILDINGS** -/-/-	**All BUILDINGS** -/-/-
A6. EXTERNAL WALLS Near Property Line		All EXTERNAL WALLS and FIRE WALLS within 1.5 m of the boundary (excluding a boundary adjoining a road or public space) must extend to not less than 450 mm above the adjoining roof to form a parapet	EXTERNAL WALLS and FIRE WALLS <0.9 m from a property boundary (excluding a boundary adjoining a road or public space) or 1.8 m from another BUILDING or FACILITY must extend to the underside of a NON-COMBUSTIBLE roof covering or EAVES lining and must: (a) have an FRL of 60/60/60 when measured from the outside, or (b) be of masonry construction not less than 90 mm thick, (c) carports are exempt from the above if it has >2 open sides and has a NON-COMBUSTIBLE roof covering, ceiling lining and wall CLADDING (including gables)

	Construction Type A	Construction Type B	Construction Type C
A7. Separation of Openings	EXTERNAL WALLS in any BUILDING other than an open-deck **Carpark** or open-deck **Stadium** that is greater than 2 STOREYS and not fully protected with a COMPLIANT SPRINKLER SYSTEM must have the openings separated vertically by any of the following: (a) a slab or other horizontal construction that projects outward from the EXTERNAL WALL >1100 mm, extends along the wall not less than 450 mm beyond the opening, and is NON-COMBUSTIBLE with a FRL of 60/60/60 (b) a spandrel > 900 mm in height, that extends not less than 600 mm above the upper surface of the intervening floor, and is NON-COMBUSTIBLE with a FRL of 60/60/60 (c) part of a CURTAIN WALL that complies with (b) above (d) construction that complies with (b) above behind a CURTAIN WALL with gaps packed with NON-COMBUSTIBLE material that will withstand thermal expansion and structural movement of walling without loss of seal against fire and smoke (e) any gap which separates two STOREYS must be packed with a NON-COMBUSTIBLE material that will withstand the relative thermal or structural movements of the wall and GLAZING without loss of seal.		
B COMMON WALLS AND FIRE WALLS			
B1. BUILDING MATERIAL	NON-COMBUSTIBLE	NON-COMBUSTIBLE	For **Single Unit Residential** and **Minor Structures**, EXTERNAL WALLS bounding a UNIT or separating adjoining UNITS must have an FRL of 60/60/60 and extend (a) from the footings or ground slab to the underside of a NON-COMBUSTIBLE roof, (b) >0.45 m above a COMBUSTIBLE roof covering, (c) comply with Specification C1.8 in the Building Code of Australia, Volume 1
B2. FRL	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/120/120 **Retail** 180/180/180 **Storage, Industrial** 240/240/240	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/120/120 **Retail** 180/180/180 **Storage, Industrial** 240/240/240	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 90/90/90 **Retail** 90/90/90 **Storage, Industrial** 90/90/90
B3. Steel Column	A steel column need not have a FRL in a BUILDING containing only one STOREY unless it is part of a FIRE WALL or COMMON WALL		
B4. Timber Columns	A BUILDING containing only one STOREY may use a timber column in a FIRE WALL or COMMON WALL provided the column has the required FRL and in all other cases the column has a FRL of not less than 10/-/-.		
C INTERIOR WALLS			
C1. BUILDING MATERIAL	Non load-bearing INTERIOR WALLS required to be FIRE-RESISTING must be of NON-COMBUSTIBLE construction and comply with LIGHTWEIGHT CONSTRUCTION standards where appropriate LOAD-BEARING INTERIOR WALLS and LOAD-BEARING FIRE WALLS (including those parts of a LOAD-BEARING SHAFT) must be of concrete or masonry, or fire-protected timber if it is a small (less than 4 STOREYS) **Communal Residential, Multiple Unit Residential** or **Office Building** with a COMPLIANT SPRINKLER SYSTEM	Non load-bearing INTERIOR WALLS required to be FIRE-RESISTING must be of NON-COMBUSTIBLE construction and comply with LIGHTWEIGHT CONSTRUCTION standards where appropriate LOAD-BEARING and LOAD-BEARING FIRE WALLS (including those part of a LOAD-BEARING SHAFT) must be of concrete or masonry or fire-protected timber if it is a small (less than 4 STOREYS) **Communal Residential, Multiple Unit Residential** or **Office Building** with a COMPLIANT SPRINKLER SYSTEM	A FIRE WALL or an INTERIOR WALL bounding a UNIT or separating adjoining UNITS must comply with LIGHTWEIGHT CONSTRUCTION standards where appropriate

	Construction Type A	Construction Type B	Construction Type C
C2. Internal Columns and Walls (other than FIRE WALLS or SHAFT walls) located immediately below a roof without a FRL- in a BUILDING <25 m in HEIGHT	**Multiple Unit Residential** **<4 STOREYS** 60/60/60 **All Other Buildings** 60/60/60 - >3 STOREYS -/-/- 3 STOREYS or less Those parts of an internal column that face and are within 1.5m of a window and are exposed through that window to a FIRE SOURCE must have the same FRL as the external part of the column	**Buildings Other Than Residential** need not comply with Table C5.D	
C3. Interior Wall Extension	INTERIOR WALLS required to have an FRL with respect to INTEGRITY and INSULATION must extend to: (a) underside of next floor above or (b) the underside of a roof complying with Table C5.D, or (c) the underside of a NON-COMBUSTIBLE roof covering permitted by Table C5.D.2 that, except for roof battens of 75mm x 50mm (or less) or SARKING-TYPE MATERIAL, must not be crossed by timber or other COMBUSTIBLE BUILDING ELEMENTS (d) a ceiling which is immediately below the roof and has a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of > 60 minutes	INTERIOR WALLS required to have an FRL must extend to: (a) the underside of the next floor above if that floor has an FRL of at least 30/30/30, or (b) the underside of a ceiling having a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above of > 60 minutes, or (c) the underside of the roof covering if it is NON-COMBUSTIBLE and, except for roof battens of 75 mm x 50 mm or less or SARKING-TYPE MATERIAL, must not be crossed by timber or other COMBUSTIBLE BUILDING ELEMENTS, or (d) 450 mm above the roof covering if it is COMBUSTIBLE	INTERIOR WALLS in **Residential** BUILDINGS with more than one family UNIT required to have an FRL must extend: (a) to the underside of the next floor above if that floor has a FRL of at least 30/30/30 or to a FIRE PROTECTIVE COVERING on the underside of the floor (b) to the underside of a ceiling having a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above itself of not less than 60 minutes, or (c) to the underside of the roof covering if NON-COMBUSTIBLE or 450 mm above adjoining roof covering if COMBUSTIBLE, and must not be crossed by timber purlins or COMBUSTIBLE material
C4. Bounding PUBLIC CORRIDORS and Hallways LOAD-BEARING	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/60/60 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/60/60 **Office, Commercial, Carpark, Assembly, Health & Aged Care** -/-/- **Retail** -/-/- **Storage, Industrial** -/-/-
C5. Bounding PUBLIC CORRIDORS and Hallways (non load-bearing)	**Tourist Accommodation, Multiple Unit + Communal Residential** -/60/60 **All Other Buildings** -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** -/60/60 **All Other Buildings** -/-/-	**All Buildings** -/-/-
C6. Between or Bounding UNITS (LOAD-BEARING)	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/60/60 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/60/60 **Office, Commercial, Carpark, Assembly, Health & Aged Care** -/-/- **Retail** -/-/- **Storage, Industrial** -/-/-
C7. Between or Bounding UNITS (non load-bearing)	**Tourist Accommodation, Multiple Unit + Communal Residential** -/60/60 **All Other Buildings** -/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** -/60/60 **All Other Buildings** -/-/-	**All Buildings** -/-/-

	Construction Type A	Construction Type B	Construction Type C
C8. Other LOAD-BEARING INTERIOR WALLS, Beams, Trusses and Columns	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/-/- **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/-/- **Retail** 180/-/- **Storage, Industrial** 240/-/-	**All Buildings** -/-/-
C9. Bounding a stairway if required to be FIRE RESISTING			**Tourist Accommodation, Multiple Unit + Communal Residential** 60/60/60 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 60/60/60 **Retail** 60/60/60- **Storage, Industrial** 60/60/60
C10. INTERIOR WALLS with Different FRLs in the Same STOREY	If a BUILDING has different uses alongside one another in the same STOREY with different FRL requirements: (a) each BUILDING ELEMENT must have the higher FRL required for all BUILDING uses concerned, or (b) the uses must be separated by a FIRE WALL having the higher FRL as required for the adjoining uses, or (c) if one part is a **Carpark**, refer to Section C5.G Fire Resisting Construction for a **Carpark**		
D SHAFTS - VENTILATING, PIPE, GARBAGE OR SIMILAR NOT FOR DISCHARGE OF HOT PRODUCTS OF COMBUSTION			
D1. SHAFTS	NON-COMBUSTIBLE construction and comply with LIGHTWEIGHT CONSTRUCTION standards where appropriate Non load-bearing ventilating, pipe, garbage or similar SHAFT required to be FIRE-RESISTING must be of NON-COMBUSTIBLE construction	NON-COMBUSTIBLE construction for **Communal and Multiple Unit Residential Buildings,** and **Assembly Buildings**, and for all other BUILDINGS if the SHAFT connects more than 2 STOREYS, except for **Single Unit Residential** Must comply with LIGHTWEIGHT CONSTRUCTION standards where appropriate	
D2. SHAFT FRL LOAD-BEARING	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/90/90 **Retail** 180/120/120 **Storage, Industrial** 240/120/120		
D3. SHAFT FRL (non load-bearing)	**Tourist Accommodation, Multiple Unit + Communal Residential** -/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** -/90/90 **Retail** -/120/120 **Storage, Industrial** -/120/120		
E LIFTS AND STAIRWAY SHAFTS			
E1. Lift Pit Combustibility	NON-COMBUSTIBLE construction of EXTERNAL WALLS, COMMON WALLS, flooring and floor FRAMING in lift pits Non load-bearing lift SHAFT must be of NON-COMBUSTIBLE construction	NON-COMBUSTIBLE construction of EXTERNAL WALLS, COMMON WALLS, flooring and floor FRAMING in lift pits except **Single Unit Residential**	

	Construction Type A	Construction Type B	Construction Type C
E2. Separation of Lift SHAFTS	See Section C Walls in this chart for requirements	LOAD-BEARING See Section C Walls in this chart for requirements Non-LOAD-BEARING must be NON-COMBUSTIBLE	
E3. FIRE-RESISTING Lift or stairway SHAFTS, LOAD-BEARING	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/120/120 **Retail** 180/120/120 **Storage, Industrial** 240/120/120	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/120/120 **Retail** 180/120/120 **Storage, Industrial** 240/120/120	
E4. FIRE-RESISTING Lift or stairway SHAFTS (non load-bearing)	**Tourist Accommodation, Multiple Unit + Communal Residential** -/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** -/120/120 **Retail** -/120/120 **Storage, Industrial** -/120/120	**Tourist Accommodation, Multiple Unit + Communal Residential** -/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** -/120/120 **Retail** -/120/120 **Storage, Industrial** -/120/120	
E5. Stairway SHAFT		If a stairway SHAFT supports any floor or a structural part of it, (a) the floor or part must have a FRL of 60/-/- or more, and (b) the junction of the stairway SHAFT must be constructed so that the floor or part will be free to sag or fall in a fire without causing structural damage to the SHAFT	
E6. EMERGENCY LIFT	An EMERGENCY LIFT must be contained within a FIRE-RESISTING SHAFT with an FRL of not less than 120/120/120		
E7. Openings in Lift SHAFTS	Openings for lift landing doors and access to service panels and equipment must be protected in accordance with Section C6 Protection of Openings		
E8. Separation of Lift SHAFT	Any lift (other than if wholly in an ATRIUM) must be separated from the remainder of the BUILDING by enclosure in a SHAFT with an appropriate FRL if it connects more than, (a) 2 STOREYS in an unsprinklered BUILDING, or (b) 3 STOREYS in a sprinklered BUILDING with protected openings (see Section C6)		
E9. Stairways and Lifts in the same SHAFT	A stairway and lift must not be in the same SHAFT if either one is required to be in a FIRE-RESISTING SHAFT		
F FLOORS			
F1. Floor loading of **Office** or **Assembly Buildings**	If a floor is designed for a LIVE LOAD not exceeding 3 kPa the floor next above (and floor beams) may have a FRL of 90/90/90, or the roof, if that is next above (including roof beams) may have a FRL of 90/60/30	A floor for Construction Type A, B or C need not comply with Table C5.D if: (a) it is laid directly on the ground, or (b) the space below is not a STOREY, for carparking, not for storage, work area, or the like (c) it is a timber stage floor in an Assembly Building and the floor below is not used as a dressing room, store room, or the like (d) it is a single UNIT in a **Communal or Multiple Unit Residential Building** (e) it is an open access floor for the accommodation of electrical services and the like, above a floor with the required FRL	
F2. Floors in FIRE COMPART-MENTS	Floors as per above FRL	Floors 90/90/90 or if protected by a COMPLIANT SPRINKLER SYSTEM 60/60/60	Floors 60/60/60

	Construction Type A	Construction Type B	Construction Type C
F3. Floor FRL	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/90/90 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/120/120 **Retail** 180/180/180 **Storage, Industrial** 240/240/240 ***Exceptions:*** *(a) floor laid directly on the ground* *(b) in residential (> 2 UNITS), **Office**S or public BUILDINGS if the space below is not a STOREY, does not accommodate motor vehicles, is not a storage or work area, and is not used for any other ancillary purpose* *(c) timber stage floor in an ASSEMBLY BUILDING laid over a floor having the required FRL if the space below the stage is not used as a dressing room, store room, or the like* *(d) floor separates 2 STOREYS within the same UNIT in a **Residential** BUILDING* *(e) open-access floor (for electrical and electronic services and the like) above a floor with the required FRL*	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/30/30 **Health-Care Building** 90/90/90 or 60/60/60 if fully protected with a COMPLIANT SPRINKLER SYSTEM **All Other Buildings** 60/60/60	**Health-Care Building** Floor above a space for motor vehicles, used for storage or other ancillary purpose, and any column supporting the floor, must: (a) have FRL of at least 30/30/30, or, (b) have a FIRE PROTECTIVE COVERING on the underside of the floor and around the column, if the floor or column is COMBUSTIBLE or fabricated from metal **Multiple Unit Residential, Health-Care Building, Assembly Building, Aged-Care Building** Floor and any column support separating STOREYS or located above a storage space, motor vehicles or other ancillary purpose must have a FRL of 30/30/30, or a FIRE PROTECTIVE COVERING on the underside of the floor (including beams) and around the column, if the floor or column is COMBUSTIBLE or is metal
F4. Floor FRL in BUILDINGS with more than one STOREY	The floor must have an FRL of not less than the FRL required for the lower STOREY	If at least one of the STOREYS is **Multiple Unit Residential** - the floor separating the residential STOREY from the one below must: (a) have a ceiling with a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of not less than 60 minutes, or (b) have an FRL of at least 30/30/30, or (c) have a FIRE PROTECTIVE COVERING on the underside of the floor, including beams, if the floor is COMBUSTIBLE or metal	If at least one of the STOREYS is **Multiple Unit Residential** - the floor separating the residential STOREY from the one below must: (a) have a ceiling with a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of not less than 60 minutes, or (b) have an FRL of at least 30/30/30, or (c) have a FIRE PROTECTIVE COVERING on the underside of the floor, including beams, if the floor is COMBUSTIBLE or metal
G ROOF			
G1 Roofs	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/60/30 **Office, Commercial, Carpark, Assembly, Health & Aged Care** 120/60/30 **Retail** 180/60/30 **Storage, Industrial** 240/90/60	**All Buildings** -/-/-	**All Buildings** -/-/-
G2. Main Roof Beams	**Tourist Accommodation, Multiple Unit + Communal Residential** 60/30/30 **All Other Buildings** 60/60/60	**Tourist Accommodation, Multiple Unit + Communal Residential** 90/-/- **All Other Buildings** 120/-/-	
G3. Roof Super-imposed on Concrete Slab	Need not comply with this Table if: (a) superimposed roof and any construction between it and concrete slab floor are NON-COMBUSTIBLE throughout (b) the concrete slab roof complies with Table C5.D		
G4 Exemption	Roof for Construction Type A, B or C need not comply with Table C5.D if the roof covering is NON-COMBUSTIBLE, and (a) it has a COMPLIANT SPRINKLER SYSTEM installed throughout, or (b) the BUILDING is a maximum of 3 STOREYS, or (c) it is in BUILDING GROUP 4 or 5, or (d) the ceiling immediately below the roof has a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the roof space of 60 minutes or more		

C5.E Fire-Resisting Construction for Building Materials

.1 A BUILDING MATERIAL will satisfy the requirements for FIRE-RESISTING construction if it is:

(a) listed in, and complies with Table C5.E.1 below (which is based on Table 1 in Specification A2.3 in the Building Code of Australia, Volume 1) or

(b) identical with a prototype that has been submitted to the STANDARD FIRE TEST, or an equivalent or more severe test, and the FRL achieved by the prototype is confirmed in a report from a REGISTERED TESTING AUTHORITY which:
- (i) describes in full the method and conditions of the test and the form of construction
- (ii) certifies that the application of restraint to the prototype complies with the STANDARD FIRE TEST, or

(c) differs in only a minor degree from a prototype tested under (b) and the FRL attributed to the BUILDING ELEMENT is confirmed in a report from a REGISTERED TESTING AUTHORITY which:
- (i) certifies that the BUILDING ELEMENT is capable of achieving the FRL despite the minor departures from the tested prototype
- (ii) describes the materials, construction and conditions of restraint which are necessary to achieve the FRL, or

(d) is designed to achieve the FRL in accordance with:
- (i) AS/NZS 2327.1, AS/NZS 4100 and AISC Guidelines for Assessment of Fire Resistance of Structural Steel Members if it is a steel or composite structure, or
- (ii) AS/NZS 3600 if it is a concrete structure, or
- (iii) AS/NZS 1720.4 if it is a solid or glued-laminated timber structure, or
- (iv) AS/NZS 3700 if it is a masonry structure; or

(e) the FRL is determined by calculation based on the performance of a prototype in the STANDARD FIRE TEST and confirmed in a report in accordance with Clause 3 below.

.3 If the FRL of a BUILDING MATERIAL is determined by calculation based on a tested prototype:

(a) the BUILDING MATERIAL may vary from the prototype in relation to:
- (i) length and HEIGHT if it is a wall
- (ii) height if it is a column
- (iii) span if it is a floor, roof or beam
- (iv) conditions of support
- (v) to a minor degree, cross-section and components

(b) the report must demonstrate by calculation that the BUILDING MATERIAL would achieve the FRL if it is subjected to the regime of the STANDARD FIRE TEST

(c) the calculations must take into account:
- (i) the temperature reached by the components of the prototype and their effects on strength and modulus of elasticity
- (ii) appropriate features of the BUILDING MATERIAL such as support, restraint, cross-sectional shape, length, HEIGHT, span, slenderness ratio, reinforcement, ratio of surface area to mass per unit length, and fire protection
- (iii) features of the prototype that influenced its performance in the STANDARD FIRE TEST although these features may not have been taken into account in the design for DEAD and LIVE LOAD
- (iv) features of the conditions of test, the manner of support and the position of the prototype during the test, that might not be reproduced in the BUILDING ELEMENT if it is exposed to fire
- (v) the design load of the BUILDING MATERIAL in comparison with the tested prototype

.4 For concrete and plaster, the FRL can be achieved with any material of Group A, B, C, D or E below:

Group A: any portland cement
Group B: any lime
Group C: any dense sand
Group D: any dense calcareous aggregate, including any limestone or any calcareous gravel
Group E: any dense siliceous aggregate, including basalt, diorite, dolerite, granite, granodiorite or trachyte

.5 For perlite and vermiculite, the FRL can be achieved with either gypsum-perlite plaster or gypsum-vermiculite plaster.

.6 If the FIRE-RESISTING covering of a steel column is LIGHTWEIGHT CONSTRUCTION, it must comply with Section C5.P Lightweight Construction of the NBC.

.7 If a non load-bearing BUILDING MATERIAL is used for a purpose where an FRL for structural adequacy, integrity and insulation is required, that BUILDING MATERIAL need not comply with the structural adequacy criteria and may be NON-COMBUSTIBLE if the part it supports is required to be NON-COMBUSTIBLE.

.8 The use of NON-COMBUSTIBLE finishes does not change the FRL requirements for the construction of walls, ceilings or floors or any other part of a BUILDING or FACILITY.

Table C5.E.1: Minimum FRL of Building Materials and Annexure

BUILDING ELEMENT AND MATERIAL	MINIMUM THICKNESS (mm) OF PRINCIPAL MATERIALS FOR FRL					ANNEX REFERENCE Clause No.
	60/60/60	90/90/90	120/120/120	180/180/180	240/240/240	
WALL						
Masonry						
Ashlar	-	-	-	-	300	1, 2, 5, 6
Calcium silicate	AS/NZS 3700 or approved equivalent or prototype					
Concrete						
Fired clay including. terracotta						
Concrete						
No-fines	-	-	-	150	170	1, 5, 6
Pre-stressed	AS/NZS 3600 or approved equivalent or prototype					
Reinforced						
Plain	-	-	-	150	170	1, 5, 6
Gypsum						
Solid gypsum blocks	75	90	100	110	125	1, 5, 6
Gypsum perlite or vermiculite plaster on metal lath and channel (non load-bearing)	50	50	65	-	-	1, 5, 7
CONCRETE COLUMN						
Pre-stressed	AS/NZS 3600 or approved equivalent or prototype					
Reinforced						
HOT-ROLLED STEEL COLUMN (including fabricated column exposed on no more than 3 sides-see Clause 8)						
Concrete Cast-in-Situ						
LOAD-BEARING	25	30	40	55	75	9, 11, 12
Non load-bearing, unplastered	25	30	40	50	65	9, 11, 12

Table C5.E.1: Minimum FRL of Building Materials and Annexure

BUILDING ELEMENT AND MATERIAL	MINIMUM THICKNESS (mm) OF PRINCIPAL MATERIALS FOR FRL					ANNEX REFERENCE
	60/60/60	90/90/90	120/120/120	180/180/180	240/240/240	Clause No.
Non load-bearing, plastered 13mm	25	25	30	40	50	1, 6, 9, 11, 12
Gypsum						
Cast-in-Situ	-	-	-	-	50	9, 11, 12
Perlite or vermiculite plaster - sprayed to contour	20	25	35	50	55	1, 11
Perlite or vermiculite plaster - sprayed on metal lath	20	20	25	35	45	1, 7
HOT-ROLLED STEEL COLUMN (including a fabricated column exposed on no more than 3 sides and with column spaces filled: -see Clause 8 and 9)						
Solid calcium-silicate masonry	50	50	50	50	65	1, 3, 11, 12
Solid clay masonry	50	50	50	65	90	1, 3, 11, 12
Solid concrete masonry	50	50	50	65	90	1, 3, 11, 12
Solid gypsum blocks	50	50	50	50	65	1, 3, 11, 12
Hollow terracotta blocks plastered 13mm	50	50	50	65	90	1, 3, 6, 10, 11, 12
HOT-ROLLED STEEL COLUMN (including a fabricated column exposed on no more than 3 sides and with column spaces unfilled: -see Clause 8)						
Solid calcium-silicate masonry	50	50	50	-	-	1, 3, 11, 12
Solid clay masonry	50	50	65	-	-	1, 3, 11, 12
Solid concrete masonry	50	50	65	-	-	1, 3, 11, 12
Solid gypsum blocks	50	50	50	-	-	1, 3, 11, 12
Hollow terracotta blocks plastered 13mm	50	50	65	-	-	1, 3, 6, 10, 11, 12
HOT-ROLLED STEEL COLUMN (including a fabricated column exposed on 4 sides -see Clause 8)						
Concrete Cast-in-Situ						
LOAD-BEARING	25	40	45	65	90	9, 11, 12
Non load-bearing unplastered	25	30	40	50	65	9, 11, 12
Non load-bearing plastered 13mm	25	25	30	40	50	1, 6, 9, 11, 12
Gypsum						
Cast-in-Situ	-	-	-	-	50	9, 11, 12
Perlite or vermiculite plaster - sprayed to contour	25	30	40	55	65	1, 11
Perlite or vermiculite plaster - sprayed on metal lath	20	20	30	40	50	1, 7
HOT-ROLLED STEEL COLUMN (including a fabricated column exposed on 4 sides and with column spaces filled -see Clause 8 and 9)						
Solid calcium-silicate masonry	50	50	50	65	75	1, 3, 11, 12
Solid clay masonry	50	50	50	75	100	1, 3, 11, 12
Solid concrete masonry	50	50	50	75	100	1, 3, 11, 12

Table C5.E.1: Minimum FRL of Building Materials and Annexure

BUILDING ELEMENT AND MATERIAL	MINIMUM THICKNESS (mm) OF PRINCIPAL MATERIALS FOR FRL					ANNEX REFERENCE Clause No.
	60/60/60	90/90/90	120/120/120	180/180/180	240/240/240	
Solid gypsum blocks	50	50	50	65	75	1, 3, 11, 12
Hollow terracotta blocks plastered 13mm	50	50	50	75	100	1, 3, 6, 10, 11, 12
HOT-ROLLED STEEL COLUMN (including a fabricated column exposed on 4 sides and with column spaces unfilled -see Clause 8)						
Solid calcium-silicate masonry	50	50	50	-	-	1, 3, 11, 12
Solid clay masonry	50	50	65	-	-	1, 3, 11, 12
Solid concrete masonry	50	50	65	-	-	1, 3, 11, 12
Solid gypsum blocks	50	50	50	-	-	1, 3, 11, 12
Hollow terracotta blocks plastered 13mm	50	50	65	-	-	1, 3, 6, 10, 11, 12
BEAM						
Concrete						
Pre-stressed	AS/NZS 3600 or approved equivalent or prototype					
Reinforced						
Hot-rolled Steel (in. an open-web joist girder truss etc.) exposed on no more than 3 sides:						8
Concrete Cast-in-Situ	25	30	40	50	65	11, 12
Perlite or vermiculite plaster - sprayed to contour	20	25	35	50	55	1, 11
Perlite or vermiculite plaster - sprayed on metal lath	20	20	25	35	45	1, 7
Hot-rolled Steel (inc. an open-web joist girder truss etc.) exposed on 4 sides:						8
Concrete Cast-in-Situ	25	40	45	95	90	11, 12
Perlite or vermiculite plaster - sprayed to contour	25	30	40	55	65	1, 11
Perlite or vermiculite plaster - sprayed on metal lath	20	20	30	40	50	1, 7
FLOOR, ROOF OR CEILING						
Concrete						
Pre-stressed	AS/NZS 3600 or approved equivalent or prototype					
Reinforced						

Annex to Table C5.E.1 (Clauses)

The use of NON-COMBUSTIBLE finishes does not change the FRL requirements for the construction of walls, ceilings or floors or any other part of a BUILDING or FACILITY.

CLAUSES

1.0 MORTAR, PLASTER AND PLASTER REINFORCEMENT

1.1 Mortar for masonry

Masonry units of ashlar, calcium silicate, concrete or fired clay (including terracotta blocks) must be laid in cement mortar or composition mortar complying with relevant provisions of AS/NZS 3700 of the Building Code of Australia, Volume 1.

1.2 Gypsum blocks

Gypsum blocks must be laid in gypsum-sand mortar or lime mortar.

1.3 Gypsum-sand mortar and plaster

Gypsum-sand mortar and gypsum-sand plaster must consist of either:

(a) not more than 3 parts by volume of sand to 1 part by volume of gypsum, or

(b) if lime putty is added, not more than 2.5 parts by volume of sand to 1 part by volume of gypsum and not more than 5% of lime putty by volume of the mixed ingredients

1.4 Gypsum-perlite and gypsum-vermiculite plaster

Gypsum-perlite or gypsum-vermiculite plaster must be applied:

(a) in either 1 or 2 coats each in the proportions of 1 m^3 of perlite or vermiculite to 640 kg of gypsum if the required thickness of the plaster is not more than 25 mm

(b) in 2 coats if required thickness is more than 25 mm - first in the proportions of 1 m^3 of perlite or vermiculite to 800 kg of gypsum and the second in the proportions of 1m^3 of perlite or vermiculite to 530 kg of gypsum

1.5 Plaster of cement and sand or cement, lime and sand

Plaster prescribed in Table C5.E.1 must consist of:

(a) cement and sand or cement, lime and sand

(b) may be finished with gypsum, gypsum-sand, gypsum-perlite or gypsum-vermiculite or with lime putty

1.6 Plaster reinforcement

If plaster used as fire protection on walls is more than 19 mm thick:

(a) it must be reinforced with expanded metal lath that:

(i) has a mass per unit area of not less than 1.84 kg/m^2

(ii) has not fewer than 98 meshes per metre

(iii) is protected against corrosion by galvanising or other suitable method, or

(b) it must be reinforced with 13 mm x 13 mm x 0.7 mm galvanised steel wire mesh, with reinforcement securely fixed at a distance from the face of the wall of not less than 1/3 of the total thickness of the plaster

2.0 ASHLAR STONE MASONRY

Ashlar masonry must not be used in a part of the BUILDING containing more than 2 STOREYS, and must not be of:

(a) perlite, granite, granodiorite, quartz dacite, quartz diorite, quartz porphyrite or quartz porphyry, or

(b) conglomerate, quartzite or sandstone, or

(c) chert or flint, or

(d) limestone or marble

3.0 DIMENSIONS OF MASONRY

The thicknesses of masonry of calcium-silicate, concrete and fired clay are calculated as follows:

3.1 Solid units

For masonry in which the amount of perforation or coring of the units does not exceed 25% by volume (based on the overall rectangular shape of the unit) the thickness of the wall must be calculated from the manufacturing dimensions of the units and the specified thickness of the joints between them as appropriate.

3.2 Hollow units

For masonry in which the amount of perforation or coring of the units exceeds 25% by volume (based on the overall rectangular shape of the unit) the thickness of the wall must be calculated from the equivalent thicknesses of the units and the specified thickness of the joints between them as appropriate.

3.3 Equivalent thickness

The equivalent thickness of a masonry unit is calculated by dividing the net volume by the area of one vertical face.

4.0 *** This Clause has deliberately been left blank.**

5.0 HEIGHT-TO-THICKNESS RATIO OF CERTAIN WALLS

Ratio of height between lateral supports to overall thickness of a wall of ashlar, no-fines concrete, unreinforced concrete, solid gypsum blocks, gypsum-perlite or gypsum-vermiculite plaster on metal lath and channel, must not exceed:

(a) 20 for a LOAD-BEARING WALL, or

(b) 27 for a Non Load-Bearing Wall

6.0 INCREASE IN THICKNESS BY PLASTERING

6.1 Walls

If a wall of ashlar, solid gypsum blocks or concrete is plastered on both sides to an equal thickness, the thickness of the wall for the purposes of Table 1 (but not for the purposes of Annexure Clause 5) may be increased by the thickness of the plaster on one side.

6.2 Columns

Where Table C5.E.1 indicates that column-protection is to be plastered, the tabulated thicknesses are those of the principal material, and do not include thickness of plaster which must be additional to the listed thickness of the material to which it is applied.

7.0 GYPSUM-PERLITE OR GYPSUM-VERMICULITE PLASTER ON METAL LATH

7.1 Walls

In walls fabricated of gypsum-perlite or gypsum-vermiculite plaster on metal lath and channel:

(a) the lath must be securely wired to each side of 19 mm x 0.44 kg/m steel channels (used as STUDS) spaced at not more than 400 mm centres

(b) the gypsum-perlite or gypsum-vermiculite plaster must be applied symmetrically to each exposed side of the lath

7.2 Columns

For the fire protection of steel columns with gypsum-perlite or gypsum-vermiculite on metal lath:

(a) the lath must be fixed at not more than 600 mm centres vertically to steel furring channels

(i) if the plaster is to be 35 mm thick or more — at least 12 mm clear of the column, or

(ii) if the plaster is to be less than 35 mm thick — at least 6 mm clear of the column, or

(b) the plaster may be applied to self-furring lath with furring dimples to hold it not less than 10 mm clear of the column, and the thickness of the plaster must be measured from the back of the lath

7.3 Beams

For the fire protection of steel beams with gypsum-perlite or gypsum-vermiculite on metal lath:

(a) the lath must be fixed at not more than 600 mm centres to steel furring channels and at least 20 mm clear of the steel

(b) the thickness of the plaster must be measured from the back of the lath

8.0 EXPOSURE OF COLUMNS AND BEAM

8.1 Columns

A column incorporated in or in contact on one or more sides with a wall of solid masonry or concrete at least 100 mm thick may be considered to be exposed to fire on no more than 3 sides.

8.2 Beams

A beam, open-web joist, girder or truss in direct and continuous contact with a concrete slab or a hollow block floor or roof may be considered to be exposed to fire on no more than 3 sides.

9.0 FILLING OF COLUMN SPACES

(a) The spaces between the fire protective material and the steel (and any re-entrant parts of the column itself) must be filled solid with a fire protective material like concrete, gypsum or grout

(b) The insides of hollow sections, including pipes, need not be filled

10.0 HOLLOW TERRACOTTA BLOCKS

The proportion of cored holes or perforations in a hollow terracotta block (based on the overall rectangular volume of the unit) must not exceed the following:

(a) for blocks up to 75 mm thick 35%

(b) for blocks more than 75 mm but not more than 100 mm 40% thick

(c) for blocks more than 100 mm 50%

11.0 REINFORCEMENT FOR COLUMN AND BEAM PROTECTION

11.1 Masonry

Masonry of calcium-silicate, fired clay and concrete for the protection of steel columns must have steel-wire or mesh reinforcement in every second course and lapped at the corners.

11.2 Gypsum blocks and hollow terracotta blocks

Gypsum blocks and hollow terracotta blocks for the protection of steel columns must have steel-wire or mesh reinforcement in every course and lapped at corners.

11.3 Structural concrete and poured gypsum

If a steel column or a steel beam is to be protected with structural concrete or poured gypsum:

(a) the concrete or gypsum must be reinforced with steel-wire mesh or steel-wire binding placed about 20 mm from its outer surface:

(i) for concrete or gypsum less than 50 mm t thick, the steel wire must be:

(A) at least 3.15 mm in diameter

(B) spaced at not more than 100 mm vertically, or

(ii) for concrete or gypsum not less than 50 mm thick, the steel wire must be either:

(A) of a diameter and spacing in accordance with (i), or

(B) at least 5 mm in diameter and spaced at not more than 150 mm vertically.

11.4 Gypsum-perlite or gypsum-vermiculite plaster sprayed to contour

(a) If a steel column or steel beam is protected with either gypsum-perlite or gypsum-vermiculite plaster sprayed to contour and the construction falls within the limits of Table C5.E.1.1, the plaster must be reinforced with:

(i) expanded metal lath complying with Clause 1.6 of the Annex to Table C5.E.1; or

(ii) galvanised steel wire mesh complying with Clause 1.6 of the Annex to Table C5.E1

(b) The reinforcement must be placed at a distance from the face of the plaster of at least 1/3 of the thickness of the plaster and must be securely fixed to the column or beam at intervals of not more than the relevant listing in Table C5.E.1.1

(c) For the purposes of Table C5.E.1.1:

(i) "vertical" includes a surface at not more than 10º to the vertical; and

(ii) "horizontal" includes a surface at not more than 10º to the horizontal; and

(iii) "underside" means the underside of any horizontal or non-vertical surface.

12.0 THICKNESS OF COLUMN AND BEAM PROTECTION

12.1 Measurement of thickness

The thickness of the fire protection to steel columns and steel beams (other than fire protection of gypsum-perlite or gypsum-vermiculite plaster sprayed on metal lath or sprayed to contour) is to be measured from the face or edge of the steel, from the face of a splice plate or from the outer part of a rivet or bolt, whichever is the closest to the outside of the fire protective construction, except that:

(a) if the thickness of the fire protection is 40 mm or more, rivet heads may be disregarded

(b) if the thickness of the fire protection is 50 mm or more:

(i) any part of a bolt (other than a high-tensile bolt) may be disregarded

(ii) a column splice plate within 900 mm of the floor may encroach upon the fire protection by up to a 1/4 of the thickness of the fire protection

(c) the flange of a column or beam may encroach by up to 12 mm upon the thickness of the fire protection at right angles to the web if:

(i) the column or beam is intended to have an FRL of 240/240/240 or 240/–/–

(ii) the flange projects 65 mm or more from the web

(iii) the thickness of the edge of the flange (inclusive of any splice plate) is not more than 40

Table C5.E.1.1: Reinforcement of Gypsum-Perlite or Gypsum-Vermiculite Plaster Sprayed to Contour

SURFACES TO BE PROTECTED	REINFORCEMENT REQUIRED IF SMALLER DIMENSION OF SURFACE EXCEEDS (mm)	MAX SPACING OF FIXINGS OF THE MESH TO SURFACE (mm)
Members with H or I cross-section		
Vertical	450	450
Non-vertical	300	300
Underside	300	300
Upper side of horizontal surface	Not required	
Members with Other Shapes		
Vertical	Any size	450
Non-vertical	Any size	300
Underside	Any size	300
Upper side of horizontal surface	Not required	

C5.F Resistance To The Incipient Spread Of Fire

.1 RESISTANCE TO THE INCIPIENT SPREAD OF FIRE must be demonstrated in ceiling membranes in structures in BUILDING GROUP 1-4 to insulate the space between the ceiling and roof, or ceiling and floor above, and limit the upward and general spread of fire throughout the BUILDING.

.2 A ceiling is deemed to have an appropriate RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above itself if:

(a) it is identical with a prototype that has been submitted to the STANDARD FIRE TEST and the RESISTANCE TO THE INCIPIENT SPREAD OF FIRE achieved by the prototype is confirmed in a report from a REGISTERED TESTING AUTHORITY which:
- (i) describes the method and conditions of the test and form of construction of the tested prototype in full
- (ii) certifies that the application of restraint to the prototype complies with the STANDARD FIRE TEST, or

(b) it differs in only a minor degree from a prototype tested under C5.F.2(a) and the RESISTANCE TO THE INCIPIENT SPREAD OF FIRE attributed to the ceiling is confirmed in a report from a REGISTERED TESTING AUTHORITY which:
- (i) certifies that the ceiling is capable of achieving the RESISTANCE TO THE INCIPIENT SPREAD OF FIRE despite the minor departures from the tested prototype
- (ii) describes the materials, construction and conditions of restraint which are necessary to achieve the RESISTANCE TO THE INCIPIENT SPREAD OF FIRE

C5.G Fire-Resisting Construction For Carparks

.1 A **Carpark** or an **Open-Deck Carpark**:

(a) includes:
- (i) an administration area associated with the functioning of the **Carpark**
- (ii) where the CARPARK is sprinklered, is associated with a **Multiple Unit Residential Building** less than 4 STOREYS in HEIGHT and provides car parking for separate **Single Occupancy Units**, each car parking area with an area not greater than 10% of its GROSS FLOOR AREA for purposes ancillary to the **Single Occupancy Units**

(b) excludes:
- (i) except for (a)(ii), any part of the BUILDING not used for car parking
- (ii) a BUILDING or part of a BUILDING specifically for the parking of trucks, buses, vans and the like

.2 A **Carpark** in a **Multiple Unit Residential Building** not more than 4 STOREYS in HEIGHT used solely for the purpose of parking motor vehicles or another ancillary non-residential use will be regarded as BUILDING GROUP 4 for the purpose of determining the appropriate FRL.

.3 Notwithstanding Table C5.D.1 and C5.E.1, a CARPARK may comply with provisions in these Tables if it is an **Open-Deck Carpark** or is protected with a COMPLIANT SPRINKLER SYSTEM and is:

(a) a separate BUILDING, or

(b) a part of a BUILDING for Construction Type A:
- (i) which only occupies part of a STOREY, and is separated form the remaining part by a FIRE WALL, or

Table C5.G.4: FRLs for Building Elements in Carparks

	Type A	Type B	Type C
FRL for Building Elements in Carparks			
Wall			
External, LOAD-BEARING. <3 m from a FIRE SOURCE	60/60/60	60/60/60	
External, non load-bearing, <3 m from a FIRE SOURCE	-/60/60	-/60/60	
External, >3 m from a FIRE SOURCE	-/-/-	-/-/-	
External, LOAD-BEARING, <1.5 m from a FIRE SOURCE			60/60/60
External, non load-bearing, <1.5 m from a FIRE SOURCE			-/60/60
External, >1.5 m from a FIRE SOURCE			-/-/-
INTERIOR, LOAD-BEARING, not supporting only the roof (not used for car parking)	60/-/-	60/-/-	-/-/-
INTERIOR, supporting only the roof (not used for car parking)	-/-/-	-/-/-	-/-/-
INTERIOR, non load-bearing	-/-/-	-/-/-	-/-/-
FIRE WALL from the direction used as a CARPARK	60/60/60	60/60/60	60/60/60
FIRE WALL from the direction not used as a CARPARK	see C5.D	see C5.D	90/90/90
Column			
(i) Supporting only the roof (not used for car parking) and 3m or more from a FIRE SOURCE	-/-/-	-/-/-	
(ii) Steel column other than (i) above, and one that does not support a part of the BUILDING not used as a **Carpark**	60/-/- or 26 m^2/tonne		
Steel column, other than (i) above		60/-/- or 26 m^2/tonne	
Any other column	60/-/-	60/-/-	
Steel column <1.5 m from a FIRE SOURCE			60/-/- or 26 m^2/tonne
Any other column <1.5 m from a FIRE SOURCE			60/-/-
Any other column			-/-/-
Beam			
Steel floor beam in continuous contact with a concrete floor slab	60/-/- or 30 m^2/tonne		
Any other beam	60/-/-		
Steel floor beam <3 m from FIRE SOURCE and in continuous contact with a concrete floor slab		60/-/- or 30 m^2/tonne	
Any other beam <3 m from FIRE SOURCE		60/-/-	
Any other beam >3 m from a FIRE SOURCE		-/-/-	
Steel floor beam <1.5 m from FIRE SOURCE and in continuous contact with a concrete floor slab			60/-/- or 30 m^2/tonne
Any other beam <1.5 m from FIRE SOURCE			60/-/-
Any other beam >1.5 m from a FIRE SOURCE			-/-/-
Other			
FIRE-RESISTING lift and stairway SHAFT (within the **Carpark** only)	60/60/60		
Lift SHAFT (Type B only)		-/-/-	
FIRE-RESISTING stairway SHAFT (within the **Carpark** only)		60/60/60	
Floor slab and vehicle ramp	60/60/60	-/-/-	-/-/-
Roof (not used for car parking)	-/-/-	-/-/-	-/-/-

Notes:
1. ESA/M means the ratio of exposed surface area to mass per unit length.
2. Refer to Specification E1.5 in Building Code of Australia, Volume 1, for special requirements for a COMPLIANT SPRINKLER SYSTEM In a CARPARK complying with this Table and located in a multiple use BUILDING

(ii) which is located above or below another BUILDING GROUP or use, and the floor separating complies with the FRL associated with Construction Type A, B and C, or
(iii) which is located above another storage part of the BUILDING not used for car parking and the floor separating them complies with Table C5.D, or
(iv) which is located below another storage part of the BUILDING and the floor separating them complies with Table C5.D.1, or

(c) a part of a BUILDING of Construction Type B or C and if occupying only part of a STOREY, is separated from the remaining part by a FIRE WALL.

.4 FRLs for BUILDING ELEMENTS and BUILDING MATERIALS in **Carparks** must comply with the minimum requirements in Table C5.G.4.

C5.H Fire-Resisting Construction For Mezzanines

.1 A MEZZANINE and its supports need not have an FRL or be NON-COMBUSTIBLE provided:

(a) the total GROSS FLOOR AREA of all the MEZZANINES in the same room does not exceed 1/3 of the floor area of the room or 200 m^2, whichever is the lesser,

(b) the FRL of each wall and column that supports any other part of the BUILDING within 6 m of the MEZZANINE is increased by the amount listed in Table C5.H.1:

Table C5.H.1: Increased FRLs for Rooms with a Mezzanine

LEVEL OTHERWISE REQUIRED FOR ANY FRL CRITERION (mins)	INCREASE IN LEVEL TO (NOT LESS THAN):
30	60
60	90
90	120
120	180
180	240
Note: The increase in level applies to each FRL criterion (structural adequacy, integrity or INSULATION) relevant to the BUILDING ELEMENT concerned	

.2 The above provision does not apply to a spectator stand or audience viewing area accommodating more than 100 persons .

C5.I Fire-Resisting Construction For Stadiums

.1 All open spectator stands and indoor sports **Stadiums** must use FIRE-RESISTING construction for the appropriate Type of Construction (A, B or C) listed in Table C5.D. 1, except for open spectator stands or indoor sports **Stadiums** which have only changing rooms, SANITARY COMPARTMENTS, and the like, below the tiered seating and:

(a) contain not more than one tier of seating (numerous rows of tiered seating incorporating cross-overs but within one viewing level)

(b) are of NON-COMBUSTIBLE construction

.2 For the purpose of determining Construction Type A, B or C, stand-alone indoor sport **Stadiums** and open spectator stands that are the primary use of the property with no other BUILDINGS other than storage facilities, parking kiosks and concession BUILDINGS will be:

(a) in BUILDING GROUP 2 - if 4 or more STOREYS in HEIGHT

(b) in BUILDING GROUP 3 - if 3 STOREYS in HEIGHT

(c) in BUILDING GROUP 4 - if 2 or less STOREYS in HEIGHT

.3 BUILDING ELEMENTS in an open spectator stand or indoor sport **Stadium** need not have the FRL shown in Table C5.D.1 and Table C5.E.1 if:

(a) the roof is NON-COMBUSTIBLE

(b) NON-COMBUSTIBLE columns and LOAD-BEARING WALLS support only the roof

(c) any non load-bearing part of an EXTERNAL WALL is less than 3 m from:
(i) any FIRE SOURCE, has an FRL greater than -/60/60, and is NON-COMBUSTIBLE
(ii) an EXTERNAL WALL of another open spectator stand if it is NON-COMBUSTIBLE

C5.J Fire-Resisting Construction For Aged-Care Buildings

.1 For Construction Type A, an **Aged-Care Building** protected with a COMPLIANT SPRINKLER SYSTEM must have an FRL criterion prescribed in Table C5.D.1.

.2 INTERIOR LOAD-BEARING WALLS need not have an FRL if:

(a) it is lined on each side with standard grade plasterboard not less than 13 mm thick or similar NON-COMBUSTIBLE material

(b) it extends:
(i) to the underside of the floor next above, or
(ii) to the underside of a ceiling lined with standard grade plasterboard not less than 13 mm thick or a material with at least an level of fire protection, or
(iii) to the underside of a NON-COMBUSTIBLE roof covering

(c) any INSULATION installed in the cavity of the wall is NON-COMBUSTIBLE

(d) any construction joint, space or the like between the top of the wall and the floor, ceiling or roof is smoke sealed with intumescent putty or other suitable material

.3 For Construction Type B or C, a floor separating STOREYS, or a floor above a space for accommodation of motor vehicles or used for storage, or any other ancillary purpose must:

(a) be constructed so that it is at least of the standard achieved by a floor/ceiling system, incorporating a ceiling which has a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above of > 60 minutes, or

(b) have an FRL of at least 30/30/30, or

(c) have a FIRE PROTECTIVE COVERING on the underside of the floor, including beams incorporated in it, if the floor is COMBUSTIBLE or of metal

C5.K Fire-Resisting Construction For Multiple Unit Residential - Construction Type A

.1 **Multiple Unit Residential Buildings** categorised as Construction Type A that have a maximum of 3 STOREYS must comply with the provisions in Table C5.D.1 for FIRE-RESISTING construction. Exceptions are allowed if the BUILDING is constructed of:

(a) timber FRAMING throughout, or

(b) NON-COMBUSTIBLE material throughout, or

(c) a combination of (a) and (b)

(d) any INSULATION installed in the cavity of a wall required to have an FRL is NON-COMBUSTIBLE

(e) the BUILDING is fitted with an AUTOMATIC SMOKE ALARM system complying with Specification E2.2a Smoke Detection and Alarm Systems of the Building Code of Australia, Volume 1

.2 **Multiple Unit Residential** having a maximum of 4 STOREYS may have the top three STOREYS constructed in accordance with C5.K.1 above provided:

(a) the lowest STOREY is used solely for the purpose of parking motor vehicles or for some other ancillary purpose

(b) the lowest STOREY is constructed of concrete or masonry

(c) the lowest STOREY and the STOREY above are separated by construction having an FRL of 90/90/90 with no openings or penetrations that would reduce the FIRE-RESISTING performance of that construction except that a doorway in that construction may be protected by a –/60/30 SELF-CLOSING FIRE DOOR

.3 For a **Multiple Unit Residential Building** complying with C5.K.1 and C5.K.2 above and fitted with a compliant SPRINKLER SYSTEM, the FRL criterion prescribed in Table C5.D.1:

(a) may be reduced to 60 for any floor and any LOAD-BEARING WALL, except if there is a FRL criterion of 90 for an EXTERNAL WALL it must be maintained when tested from the outside

(b) for any non load-bearing INTERIOR WALL, need not apply if:
- (i) lined on each side with 13 mm standard grade plasterboard or similar NON-COMBUSTIBLE material
- (ii) it extends:
  - (A) to the underside of the floor next above, or
  - (B) to the underside of a ceiling with a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of 60 minutes, or
  - (C) to the underside of a NON-COMBUSTIBLE roof covering
- (iii) any INSULATION installed in the cavity of the wall is NON-COMBUSTIBLE
- (iv) any construction joint, space or the like between the top of the wall and the floor, ceiling or roof is smoke sealed with intumescent putty or other suitable material
- (v) any doorway in the wall is protected by a SELF-CLOSING, tight fitting, solid core door > 35 mm thick

C5.L Fire-Resisting Construction For Multiple Unit Residential - Construction Type B

.1 **Multiple Unit Residential Buildings** categorised as Construction Type A that have 2 STOREYS or less must comply with the provisions in Table C5.D.1 for FIRE-RESISTING construction. Exceptions are allowed if the BUILDING is constructed using:

(a) timber FRAMING throughout, or

(b) NON-COMBUSTIBLE material throughout, or

(c) a combination of (a) and (b)

and

(d) any INSULATION installed in the cavity of a wall required to have an FRL is NON-COMBUSTIBLE

(e) the BUILDING is fitted with an AUTOMATIC SMOKE ALARM system complying with Specification E2.2a Smoke Detection and Alarm System in the Building Code of Australia, Volume 1

.2 **Multiple Unit Residential Buildings** with a maximum of 2 STOREYS may have the top STOREY constructed in accordance with C5.L.1 above provided:

(a) the lowest STOREY is used solely for the purpose of parking motor vehicles or for some other ancillary purpose

(b) the lowest STOREY is constructed of concrete or masonry

(c) the lowest STOREY and the STOREY above are separated by construction having an FRL of not less than 90/90/90 with no openings or penetrations that would reduce the FIRE-RESISTING performance of that construction except that a doorway in that construction may be protected by a –/60/30 SELF-CLOSING FIRE DOOR

.3 For a **Multiple Unit Residential Building** complying with Section C5.L.1 or C5.L.2 above and fitted with a COMPLIANT SPRINKLER SYSTEM, the FRL criterion prescribed in Table C5.D.1:

(a) may be reduced to 60 for any LOAD-BEARING WALL, except if there is a FRL criterion of 90 for an EXTERNAL WALL IT must be maintained when tested from the outside

(b) for any non load-bearing INTERIOR WALL, need not apply, if:

- (i) lined on both sides with 13mm standard grade plasterboard or similar NON-COMBUSTIBLE material
- (ii) it extends:
  - (A) to the underside of the floor next above if that floor has an FRL of at least 30/30/30 or is lined on the underside with a FIRE PROTECTIVE COVERING, or
  - (B) to the underside of a ceiling with a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE of 60 minutes, or
  - (C) to the underside of a NON-COMBUSTIBLE roof covering
- (iii) any INSULATION installed in the cavity of the wall is NON-COMBUSTIBLE
- (iv) any construction joints, spaces and the like between the top of the wall and the floor, ceiling or roof is smoke sealed with intumescent putty or other suitable material

.4 A floor separating STOREYS, or above a space for accommodation of motor vehicles or used for storage, or any other ancillary purpose must:

(a) be constructed so that it is at least of the standard achieved by a floor/ceiling system, incorporating a ceiling which has a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above of > 60 minutes, or

(b) have an FRL of at least 30/30/30, or

(c) have a FIRE PROTECTIVE COVERING on the underside of the floor, including beams incorporated in it, if the floor is COMBUSTIBLE or of metal

C5.M Fire-Resisting Construction For Multiple Unit Residential - Construction Type C

.1 A floor separating STOREYS, or above a space for the accommodation of motor vehicles or used for storage or any other ancillary purpose, and any column supporting the floor, must:

(a) have an FRL of at least 30/30/30, or

(b) have a FIRE PROTECTIVE COVERING on the underside of the floor including beams incorporated in it and around the column, if the floor or column is COMBUSTIBLE or of metal

C5.N Fire-Resisting Construction for Health-Care and Assembly Buildings

.1 For Construction Type B, a floor separating STOREYS or above a space for motor vehicle parking, storage or other ancillary use must:

(a) be constructed to the higher FIRE-RESISTING standard of the floor or ceiling, and have a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE to the space above of not less than 60 minutes, or

(b) have an FRL of at least 30/30/30, or

(c) have a FIRE PROTECTIVE COVERING on the underside of the floor, including beams, if the floor is COMBUSTIBLE or of metal

C5.O Fire-Resisting Construction For Single Unit Residential and Minor Structures

.1 Where a **Minor Structure** is located between a **Single Unit Residential Building** and the property boundary (other than where the boundary adjoins a road alignment or other public space), both BUILDINGS may require FIRE-RESISTING construction depending on the arrangement of the BUILDINGS on the property in relation to one another and the property boundary. For specific requirements, refer to the following Figures in Section 3.7.1 of the Building Code of Australia, Volume 2:

(a) Figure 3.7.1.4 for **Minor Structures** located between the **Residential** BUILDING and the property boundary

(b) Figure 3.7.1.5 where a **Minor Structure** is located between two or more BUILDINGS on the SITE

(c) Figure 3.7.1.6 where two or more **Minor Structures** separate two or more BUILDINGS on the SITE

(d) Figures 3.7.1.7(a), (b), and (c), and Figure 3.7.1.8 for carports and verandas

.2 Openings in EXTERNAL WALLS required to be FIRE-RESISTING (according to Table C5.D - Section A6) must be protected by:

(a) non-operable FIRE WINDOWS and/or other FIRE-RESISTING construction with an FRL of -/60/- or greater, or

(b) SELF-CLOSING solid core doors not less than 35mm thick

C5.P Encroachments for Single Unit Residential Buildings

.1 The ENCROACHMENTS allowed within 900 mm of a property boundary or within 1.8 m of another BUILDING on the same property are:

(a) FASCIA, GUTTERS and downpipes

(b) EAVES with NON-COMBUSTIBLE roof CLADDING and NON-COMBUSTIBLE lining

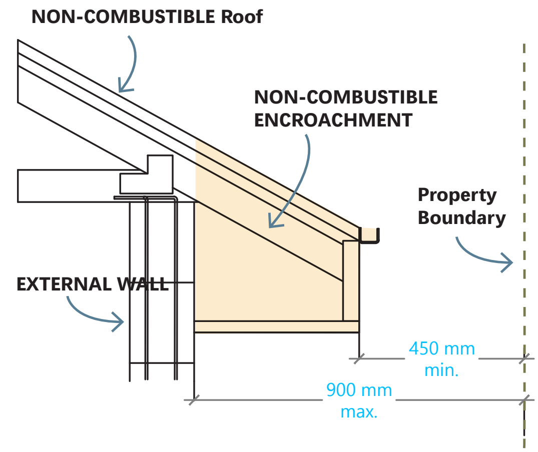
(c) flues, chimneys, pipes, domestic fuel tanks, cooling or heating appliances, meters or other SITE SERVICING equipment

(d) light fittings, electricity or gas meters, aerials or antennas

(e) pergolas, sun blinds or water tanks

(f) unroofed terraces, landings, steps and ramps, not more than 1 m in HEIGHT

Figure C5.P.2
Non-Combustible Encroachments Permitted for Building Group 5



.2 ENCROACHMENTS listed above in Section C5.P.1(a), if COMBUSTIBLE, and Section C5.P.1(b) and (c) must not be built within 450 mm of a property boundary nor be built within 0.9 m of the EXTERNAL WALL or associated ENCROACHMENTS of another BUILDING on the same property, as illustrated in Figure C5.P.2.

ACCEPTABLE SOLUTIONS

AS 1530: 1994 Methods For Fire Tests On Building Materials, Components and Structures
Part 1: Combustibility Test For Materials
Part 2: Text For Flammability Of Materials
Part 3: Simultaneous Determination of Ignitability, Flame Propagation, Heat Release and Smoke Release
Part 4: Fire-Resistance Texts on Elements of Construction
AS 1720: 1990 Timber Structures, Part 4 Fire Resistance of Structural Timber

AS/NZS 1720.4: 2006 Timber Structures
AS/NZS 2327.1: 1980 Composite Construction In Structural Steel and Concrete (known as the SAA Composite Construction Code - Simply Supported Beams
AS/NZS 3600: 2009 Concrete Structures
AS/NZS 3700: 2011 Masonry Structures
AS/NZS 4100: 1998 Steel Structures
AS/NZS 4232: 1994 Performance Criteria for Fire Resisting Enclosures, Part 2: 1988 Fire Resisting Glazing Systems
AS/NZS 4520: 2010 Fire Resistant Doorsets

AISC Guidelines For Assessment of Fire Resistance of Structural Steel Members

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

BRANZ Study Report No. 137: 2005 Development Of The Vertical Channel Test Method For Regulatory Control Of Combustible Exterior Cladding Systems

ISO 1182: 2010 Reaction to Fire Tests for Products - Non-Combustibility Test
ISO 5660: 2015 Reaction to Fire Tests - Heat Release, Smoke Production and Mass Loss Rate
ISO 9239: 2010 Reaction to Fire Tests for Flooring
ISO 9705: 1993 Fire Tests - Full Scale Room Test for Surface Products

NFPA 285: 1998 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Components Using the Intermediate Scale, Multi-storey Test Apparatus

Building Code Of Australia, Volume 1

- Specification A2.3 Fire Resistance Of Building Elements
- Specification A2.4 Determining Fire Hazard Properties
- Specification C1.1 Fire-Resisting Construction
- Specification C1.8 Lightweight Construction
- Specification C1.10 Fire Hazard Properties
- Specification C1.11 Performance Of External Walls in Fire
- Specification C3.4 Fire Doors, Smoke Doors, Fire Windows And Shutters

Building Code Of Australia, Volume 2

- Figure 3.7.1.4 Protection Of Class 1 Buildings - Class 10A Between Class 1 and the Allotment Boundary
- Figure 3.7.1.5 Protection Of Class 1 Buildings - Class 10A Between Class 1 and Other Buildings on Allotment
- Figure 3.7.1.6 Protection Of Class 1 Buildings - Separation of Class 10A Buildings on an Allotment
- Figure SA 3.7.1.7a Fire-Resisting Requirements for Carports or Verandahs without a Ceiling
- Figure SA 3.7.1.7b Fire-Resisting Requirements for Carports or Verandahs with a Non-Combustible Ceiling
- Figure SA 3.7.1.7c Fire-Resisting Requirements for External Walls in Carports and Verandahs that Share a Common Roof Space
- Figure SA 3.7.1.7d Fire-Resisting Requirements for Roof Space Openings in Carports and Verandahs with a Ceiling that Share a Common Roof Space
- Figure 3.7.1.8 Requirements for Non-Combustible Infill Panels to Carport

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- List of Materials with FRLs for BUILDING ELEMENTS, and BUILDING MATERIALS,
- List of FRLs and Fire Engineering Strategy for CARPARKs, Mezzanines, Stadiums, Aged-Care Buildings, Multiple Unit Residential BUILDINGS for Construction Type A, B or C

C6 Protection of Service Openings

REQUIRED PERFORMANCE

.1 Any opening for SITE SERVICING or ventilation must be protected, to the degree necessary, so that an adequate level of performance is maintained to resist the spread of fire, and maintain separation and compartmentation.:

(a) where openings, construction joints and the like occur

(b) where penetrations occur for PLUMBING and WIRING (electrical, telecommunications)

2. Openings of any nature in the envelope surrounding FIRE COMPARTMENTS must not allow the passage of dangerous amounts of heat, flames, smoke and gases within or outside the FIRE COMPARTMENT and for a period of time sufficient to:

(a) allow the safe evacuation of all affected people

(b) allow EMERGENCY RESPONDERS to perform necessary tasks

The sufficiency of the time duration allowed must take into account the nature of the occupancy of the BUILDING as well as the proximity to other BUILDINGS and their occupancy.

DEEMED-TO-SATISFY PROVISIONS

C6.A Exemptions and Interpretation

.1 The following are exempt from Section C6 Protection of Openings:

(a) control joints, weep holes and the like in EXTERNAL WALLS of masonry construction and joints between panels in EXTERNAL WALLS of pre-cast concrete panel construction if, in all cases they are not larger than necessary for the purpose

(b) NON-COMBUSTIBLE ventilators for sub-floor or cavity ventilation, if each does not exceed 45,000 mm^2 in face area and is spaced not less than 2 m from any other ventilator in the same wall

(c) openings in the vertical plane formed between BUILDING ELEMENTS at the construction edge or perimeter of a balcony or veranda, colonnade, terrace, or the like

(d) PLUMBING and SITE SERVICING penetrations in a **Carpark** (other than in a floor that separates a part not used as a carpark)

.2 Openings between BUILDING ELEMENTS such as columns, beams and the like, in the plane formed at the construction edge or perimeter of the BUILDING, are deemed to be openings in an EXTERNAL WALL.

C6.B Site Servicing Openings In Floors, Walls and Ceilings

.1 Where mechanical piping passes through a floor that is required to have an FRL with respect to integrity and INSULATION, or a ceiling required to have a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE, the PLUMBING must be protected as follows:

(a) BUILDING of Type A construction - by a SHAFT complying with Section C5.D, or

(b) BUILDING of Type B or C construction - by a SHAFT that will not reduce the fire performance of the BUILDING ELEMENTS it penetrates

.2 Where PLUMBING passes through a floor which is required to be protected by a FIRE PROTECTIVE COVERING, the penetration must not reduce the fire performance of the covering.

.3 Openings in floors, walls and ceilings for electrical WIRING must be close-fitting to the WIRING system and a minimum of 50mm from any other SITE SERVICING opening.

.4 Openings for PLUMBING and WIRING must be properly sealed to meet the required level of FIRE RESISTANCE for the floor, wall or ceiling, and the sealing must:

(a) be compatible with the materials of the PLUMBING and/or WIRING system

(b) be of adequate stability to withstand stresses that may arise to the PLUMBING or WIRING system as a result of a fire through either:
(i) installing adequate CABLE clamps or pipe hangars within 750 mm of the seal, or
(ii) use of a sealing system that provides adequate support

(c) achieve the same FIRE-RESISTANCE and WATER RESISTANCE as the floors, walls and ceilings that have been penetrated

(d) avoid the accumulation of:
(i) water near the seal
(ii) dripping water that may travel along the pipes or wires towards the seal

(e) permit thermal movement of the WIRING system without reduction of the sealing quality

C6.C Openings in Service Shafts

.1 In a BUILDING of Type A construction, an opening in a wall providing access to a ventilating, pipe, garbage or other SITE SERVICING SHAFT must be protected by:

(a) if it is in a SANITARY COMPARTMENT — a door or panel which, together with its frame, is NON-COMBUSTIBLE or has an FRL of not less than –/30/30, or

(b) a SELF-CLOSING –/60/30 FIRE DOOR or hopper, or

(c) an access panel having an FRL of not less than –/60/30, or

(d) if the SHAFT is a garbage SHAFT — a door or hopper of NON-COMBUSTIBLE construction

C6.D Site Servicing Materials - Building Groups 1-4

.1 Where electrical, electronic, PLUMBING, mechanical ventilation, air conditioning or other piping penetrates a BUILDING ELEMENT (other than an EXTERNAL WALL or roof) that is required to have an FRL with respect to integrity or INSULATION, or a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE, that installation must comply with any one of the following:

Tested systems
(a) it must be identical with a prototype assembly which has been tested in accordance with AS/NZS 4072.1 and AS/NZS 1530.4 and has achieved the required FRL or RESISTANCE TO THE INCIPIENT SPREAD OF FIRE

(b) it complies with (a) except for the INSULATION criteria if:
- (i) it is a piped system comprised entirely of metal (excluding pipe seals or the like)
- (ii) any COMBUSTIBLE BUILDING ELEMENT is not located within 100 mm of the PLUMBING or SITE SERVICING installation for a distance of 2 m from the penetration
- (iii) COMBUSTIBLE material is not able to be located within 100 mm of the PLUMBING or SITE SERVICING installation for a distance of 2 m from the penetration
- (iv) it is not located in a required EXIT

Ventilation and air conditioning

(c) in the case of ventilating or air conditioning ducts or equipment, the installation is in accordance with AS/NZS 1668.1

Compliance with Specification C3.15 Penetration of Walls, Floors and Ceilings by Services in the Building Code of Australia, Volume 1

(d) a mechanical pipe system comprised entirely of metal (excluding pipe seals or the like) is installed in accordance with Specification C3.15 and it:
- (i) penetrates a wall, floor or ceiling, but not a ceiling required to have a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE
- (ii) connects not more than two FIRE COMPARTMENTS in addition to any FIRE-RESISTING SITE SERVICING SHAFTS
- (iii) does not contain a FLAMMABLE or COMBUSTIBLE liquid or gas

(e) PLUMBING installed in accordance with Specification C3.15 and it:
- (i) is of metal or uPVC pipe
- (ii) penetrates the floors of all non-residential BUILDINGS except for **Health-Care** or **Aged-Care Buildings**
- (iii) is in a SANITARY COMPARTMENT separated from other parts of the BUILDING by walls with the FRL required by Section C5.D for a STAIRWAY SHAFT in the BUILDING and a SELF-CLOSING –/60/30 FIRE DOOR

(f) it is a wire or CABLE, or a cluster of wires or CABLES installed in accordance with Specification C3.15 and it:
- (i) penetrates a wall, floor or ceiling, but not a ceiling required to have a RESISTANCE TO THE INCIPIENT SPREAD OF FIRE
- (ii) connects not more than two FIRE COMPARTMENTS in addition to any FIRE-RESISTING SITE SERVICING SHAFTS

(g) it is an electrical switch, outlet, or the like, and it is installed in accordance with Specification C3.15

C6.E Site Servicing Materials - Building Group 5 (Single Unit Residential)

.1 All openings other than electrical must have a FRL of not less than -/60/60.

.2 If an electrical wire or CABLE penetrates a FIRE WALL:

(a) it must be identical with a prototype assembly which has been tested in accordance with AS 4072.1 and AS 1530.4 and achieved a FRL of -/60/60, or

(b) it must be installed so that:
- (i) the opening is neatly formed, cut or drilled and no closer than 50 mm to any other PLUMBING or SITE SERVICING installation
- (ii) the opening is no larger in cross-section than:
  - (A) 2,000 m^2 if only a single CABLE is accommodated and the gap between the CABLE and the wall is no wider than 15mm, or
  - (B) 500 mm^2 in any other case
- (iii) any gap between the PLUMBING or SITE SERVICING installation and the wall is packed with mineral fibre or other suitable FIRE RESISTANT material

.3 If an electrical switch, outlet, socket or the like is accommodated in a FIRE WALL:

(a) it must be identical with a prototype assembly which has been tested in accordance with AS 4072.1 and AS 1530.4 and achieved an FRL of -/60/60, or

(b) it must be installed so that:
  (i) the opening or recess must not:
    (A) be located opposite any point within 300 mm horizontally or 600 mm vertically of any opening or recess on the opposite side of the wall
    (B) extend beyond half the thickness of the wall

  (ii) any gap between the PLUMBING or SITE SERVICING penetration and the wall is packed with mineral fibre or other suitable FIRE RESISTANT material

C6.F Construction Joint Openings

.1 Construction joints, spaces and the like in and between BUILDING ELEMENTS required to be FIRE-RESISTING with respect to integrity and INSULATION must be protected in a manner identical with a prototype tested in accordance with AS/NZS 1530.4 to achieve the required FRL.

ACCEPTABLE SOLUTIONS

AS 1905: 1976 Components for the Protection of Openings in Fire-Resistant Walls
Part 1: Fire-Resistant Doorsets
Part 2: Fire-Resistant Roller Shutters

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

NZS 4520: 2010 Fire-Resistant Doorsets

Building Code of Australian, Volume 1
Specification C2.5 Smoke-Proof Walls in Healthcare and Aged Care Buildings
Specification C3.15 Penetration of Walls, Floors and Ceilings by Services
Specification E3.1 Lift Installations

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Construction details must indicate effective methods for reducing spread of fire through appropriate materials, sealants and achieving the appropriate FRL for all openings

C7 Fire Safety Systems - All Buildings

REQUIRED PERFORMANCE

.1 A FIRE SAFETY SYSTEM must be designed and installed for each BUILDING, FACILITY, SITE and/or UNIT to safeguard people from injury or illness, and have the ability to:

(a) detect fire/smoke

(b) warn people of an emergency and direct them to a PLACE OF SAFETY- BUILDING GROUPS 1-4

(c) extinguish the fire - BUILDING GROUPS 1-3 and **Industrial/Commercial**/**Residential Buildings** in BUILDING GROUP 4

(d) continue to operate for a period of time necessary to ensure the intended function of the equipment is maintained during the fire - BUILDING GROUP 1 and 2

(e) control fire spread despite the failure of any FIRE SAFETY SYSTEM (BUILDING GROUPS 1-4)

(f) allow EMERGENCY RESPONDERS to safely reach the floor of fire origin, search the general area of fire origin, and protect the means of egress

.2 The FIRE SAFETY SYSTEM for each BUILDING, FACILITY and SITE must be appropriate to:

(a) BUILDING size, scale, function and occupancy

(b) proximity to actual and potential fire sources

(c) type and placement of FIRE-RESISTING construction

(d) size and placement of FIRE COMPARTMENTS

(e) flow rate and pressure of water supply available for emergencies

(f) capacity and resources of EMERGENCY RESPONDERS that serve the area

(g) technical resources available locally to satisfactorily install, test and maintain the FIRE SAFETY SYSTEM

but does not apply to **Minor** or **Temporary Structures** or activities on SITE without a fire source

.3 A COMPLIANT SPRINKLER SYSTEM and/or fire suppression systems must be installed in structures in BUILDING GROUP 1-4 where people would otherwise be:

(a) unlikely to reach a PLACE OF SAFETY in adequate time because of the number of STOREYS in the BUILDING or the massing, scale and location of HABITABLE ROOMS, or

(b) at high risk due to the FIRE LOAD and FIRE HAZARD within the BUILDING

(c) within a **Health-Care** or **Aged-Care Building** in BUILDING GROUP 1-3

.4 The provision of emergency lighting for safe evacuation must be appropriate to:

(a) the function or use of the BUILDING, FACILITY and SITE

(b) GROSS FLOOR AREA

(c) distance of travel to an EXIT

DEEMED-TO-SATISFY PROVISIONS

C7.A Fire Safety System Equipment

.1 The FIRE SAFETY SYSTEM for a BUILDING, FACILITY and SITE must consist of adequate fire and smoke detection and warning, and fire suppression equipment appropriate to the size, scale, function and occupancy, and must be installed as indicated in Table C7.A.1:

Table C7.A.1: Fire Safety Equipment Requirements per Building Function

REQUIRED FIRE SAFETY SYSTEM EQUIPMENT	Automatic Fire Alarm	Compliant Sprinkler System	Fire Control Centre	Fire Control Panel	Fire Hose Reel	Fire Hydrant	Manual Fire Alarm Box	Portable Fire Extinguisher	Riser Main	Smoke Alarm	Smoke Control System	Smoke Detector / Heat Sensor
TALL BUILDINGS (4 STOREYS or greater)	•	•	•	•	•	•	•	•	•	•	•	•
Buildings And Facilities Less than 4 STOREYS												
BUILDINGS that use, store and/ or manufacture **HAZARDOUS SUBSTANCES**	•	•	•	•	•	•	•	•	•	•	•	•
BUILDING GROUP 1 - 2 **Major Infrastructure** **Health-Care** **Tourist Accommodation** (8 guest rooms or more) **School** (more than 30 students) Public Works Buildings, Airports Emergency Services	•	•	•	•	•	•	•	•	•	•	•	•
BUILDING GROUP 3 **Tourist Accommodation** (1-8 guest rooms) **Assembly** (> 150 m²) **Aged-Care** **> 350m² GROSS FLOOR AREA:** **Communal Residential** **Office/Commercial** **Mixed Use** **Industrial / Storage**	•	•		•	•	•	•	•	•	•	•	•
BUILDING GROUP 3 **Multiple Unit Residential** **Heritage**	•				•	•	•	•	•	•		•
BUILDING GROUP 4 **Multiple Unit Residential** (<4 UNITS) **Assembly** (150 m² or less) **Retail** (50 m² or less) **School** (2 classrooms or less) **Fale Tourist Accommodation** **< 350 m² GROSS FLOOR AREA** **Communal Residential** **Office/Commercial** **Mixed Use** **Industrial / Storage**					•	•	•	•		•		
BUILDING GROUP 5 **Regulated Fale** **Single Unit Residential** **Temporary / Minor Structures**										•		

Note: The above represents the minimum requirements. Additional components of a FIRE SAFETY SYSTEM other than the requirements listed above must be used for any type of BUILDING, FACILITY or SITE if required by SFESA

(d) smoke management features through natural or artificial ventilation

(e) more than one pedestrian EXIT at opposite sides of the **Carpark** , the number appropriate to the size and configuration of the **Carpark,** and each EXIT constructed as an EVACUATION ROUTE

(f) more than one vehicular exit if the **Carpark** is greater than one STOREY

.2 In addition to Table C7.A.1 above, carbon monoxide detection and alarm devices may be required by the Government of Samoa if the BUILDING or FACILITY contains any, some or all of the following:

(a) enclosed garage for motor vehicles with an air ventilation system that connects with the interior of the BUILDING and/or FACILITY

(b) fuel-fired appliances, gas stoves, gas heaters or gas-fueled appliances / equipment if there is the chance for carbon monoxide to be trapped in the room, and/or be released elsewhere in the BUILDING or FACILITY

.3 Carbon monoxide detectors and alarms must be installed in appropriate locations and frequencies in a BUILDING and FACILITY, and **not**:

(a) where the temperature may drop below 4.4° C (40° F) or exceed 37.8° C (100° F)

(b) near paint thinner fumes or cleaning products. without proper ventilation

(c) within 1.5 m of any cooking or open flame appliances

(d) in exhaust streams from gas engines, vents, flues or chimneys or automobile engines

.4 A SMOKE ALARM, SMOKE DETECTOR, and/or HEAT SENSOR attached to a ceiling must be located a minimum of 30cm from the adjoining walls.

C7.B Manual Fire Alarm Box

.1 All BUILDINGS, FACILITIES and SITES in BUILDING GROUP 1-3 required to have a MANUAL FIRE ALARM BOX must have a minimum of one provided in an approved location, and it must be directly connected to the SFESA fire alarm system such that SFESA is automatically notified when the building's FIRE SAFETY SYSTEM is activated.

.2 All BUILDINGS, FACILITIES and SITES in BUILDING GROUP 4 required to have a MANUAL FIRE ALARM BOX must have at least one provided in an approved location, and it need not be connected to the SFESA fire alarm system but instead be used to notify occupants of an emergency situation.

.3 The requirement for manual alarm boxes is waived when:

(a) a COMPLIANT SPRINKLER SYSTEM and/or fire suppression system can adequately control the spread of fire

(b) all individual sleeping units and contiguous attic and crawl spaces are separated from each other and public or common areas by FIRE-RESISTING construction with at least 1-hour FIRE RESISTANCE, and each individual sleeping unit has an EXIT directly to a public way, egress court or yard in **Health-Care, Aged-Care** and **Multiple Unit Residential Buildings** not more than two STOREYS in HEIGHT

.4 MANUAL FIRE ALARM BOXES must be located not more than 1.5 m from an EXIT. Additional MANUAL FIRE ALARM BOXES must be located so that travel distance to the nearest box does not exceed 60 m. When **Single Occupancy Units** are served by a single EXIT stairway, additional boxes at other than the ground floor may be omitted.

.5 MANUAL FIRE ALARM BOXES must:

(a) be a minimum height from the FINISHED FLOOR of 1. m and a maximum of 1.4 m measured vertically from the floor to the activating handle or lever of the box, and be fully ACCESSIBLE

(b) be red in color

(c) have an approved permanent sign installed adjacent to it that reads: WHEN ALARM SOUNDS CALL FIRE DEPARTMENT - with the correct phone number, unless the manufacturer has permanently provided this information on the MANUAL FIRE ALARM BOX

(d) comply with NZS 4561

(e) be a break-glass style, or similar, to the satisfaction of the Government of Samoa

C7.C Smoke Detectors and Automated Fire Alarms

.1 SMOKE DETECTORS and AUTOMATIC FIRE ALARMS must be installed in all BUILDINGS at the minimum frequency listed in Table C7.C.1, and more frequently as determined by the Government of Samoa SFESA based on the type, occupancy, use and scale of the BUILDING, FACILITY and/or SITE.

Table C7.C.1 Minimum Frequency and Location of Smoke Detectors and Smoke Alarms

BUILDING FUNCTION	Smoke Detector and Smoke Alarm Placement (see Table C7.A.1 to identify Buildings that require these)
BUILDING GROUP 1-4, excluding **Minor** and **Temporary Structures** and those listed below	• in any enclosed room containing HAZARDOUS SUBSTANCES at a rate suitable to the FIRE HAZARD potential • in all enclosed portions of EVACUATION ROUTES and not more than 1.5 m horizontal distance from the approach side of the doorway in an EVACUATION ROUTE • in any HABITABLE ROOM and/or hallway connected to the rooms, that could be impacted by the consequences of a fire, DISASTER or other emergency • on both sides of an entrance to an escalator, elevator, moving walkway, stairway or pedestrian ramp, not more than 1.5 m horizontal distance from the opening • in accordance with Specification E2.2a Smoke Detection And Alarm Systems of the Building Code of Australia, Volume 1, and in accordance with AS 3786 Smoke Alarms
Health-Care and **Aged-Care Buildings**	• in every room, PUBLIC CORRIDOR and other internal public spaces, and interconnected to form a common alarm • provision of manual call points in EVACUATION ROUTES so that no point is more than 30 m from a manual call point
Communal Residential and Multiple Unit Buildings	• one per STOREY in common enclosed corridors, hallways, lobbies • within each UNIT - same as BUILDING GROUP 5 below
BUILDING GROUP 5	• in any enclosed hallway connecting to bedrooms and/or in each bedroom • in any other enclosed STOREY

.2 All SMOKE DETECTORS and AUTOMATED SMOKE ALARMS are required to be connected to the power supply for the BUILDING with a 10-year battery back-up.

.3 SMOKE DETECTORS and AUTOMATED SMOKE ALARMS must be safely installed in appropriate locations within the structure:

(a) external to air conditioning and ventilation ducts, wherever possible

(b) at natural collection points for hot smoke based on ceiling geometry and likely migratory path

(c) no closer than 3m from SMOKE DOORS or FIRE DOORS

(d) in locations free from dust accumulation or other particles

(e) near or on the ceiling

.4 SMOKE DETECTORS and AUTOMATED FIRE ALARMS must initiate occupant notification of an emergency upon activation of:

(a) SMOKE DETECTORS

(b) COMPLIANT SPRINKLER SYSTEM waterflow devices

(c) MANUAL FIRE ALARM BOXES

(d) AUTOMATIC FIRE SUPPRESSION systems

and must be linked to SFESA (Samoa Fire and Emergency Services Authority)

.5 SMOKE DETECTORS required to activate automatic shutdown of air-handling systems and/or a SMOKE CONTROL SYSTEM must:

(a) be spaced:
- (i) not more than 20 m apart and not more than 10 m from any wall, bulkhead or smoke curtain
- (ii) in enclosed malls and PUBLIC CORRIDORS - not more than 15 m apart and not more than 7.5 m from any wall, bulkhead or curtain

(b) have a sensitivity:
- (i) in accordance with AS/NZS 1668.1 in areas other than a multi-storey PUBLIC CORRIDOR or ATRIUM
- (ii) not exceeding 0.5% smoke obscuration per metre with compensation for external airborne contamination as necessary, in a multi-storey PUBLIC CORRIDOR or ATRIUM

(c) form part of a FIRE SAFETY SYSTEM complying with AS/NZS 1670.1, or

(d) be a separate dedicated system incorporating control and equipment complying with AS/NZS 1670.1

.6 In a **Health-Care Building**, SMOKE DETECTORS:

(a) must be photoelectric type SMOKE DETECTORS and be installed in patient care areas and in paths of travel to EMERGENCY EXITS from patient care areas

(b) may be replaced by any other detector deemed suitable in accordance with AS/NZS 1670.1

(c) are not needed if there is a COMPLIANT SPRINKLER SYSTEM

.7 In an **Aged-Care Building**, SMOKE DETECTORS must include a remote AUTOMATIC indication of each FIRE COMPARTMENT by means of:

(a) mimic panels with an illuminated display, or

(b) annunciator panels with alpha numeric display, and

(c) if the BUILDING accommodates more than 20 residents, manual call points must be installed in paths of

travel so that no point on a floor is more than 30 m from a manual call point

.8 In commercial kitchens and other areas where the use is likely to result in SMOKE ALARMS causing spurious signals:

(a) any SMOKE DETECTOR or AUTOMATED FIRE ALARM deemed suitable in accordance with AS/NZS 1670.1 may be installed provided that SMOKE ALARMS are installed elsewhere in a **Single Occupancy Unit**

(b) an alarm acknowledgment mechanism may be installed except where the kitchen or other area is sprinklered, the alarms need not be installed in the kitchen or other areas likely to result in spurious signals.

.9 Disposal of SMOKE ALARMS must be handled according to procedures for HAZARDOUS SUBSTANCES as material may be radioactive when not in use.

C7.D Compliant Sprinkler Systems

.1 A COMPLIANT SPRINKLER SYSTEM must:

(a) be installed in a BUILDING or part of a BUILDING when required by Table C7.D.1

Table C7.D.1: Requirement for Compliant Sprinkler Systems per Building Function

Occupancy	When Sprinklers Are Required
TALL BUILDINGS, except: • **Open-Deck Carpark** being a stand-alone BUILDING • electricity network substation with GROSS FLOOR AREA <200 m^2 in a multiple-use BUILDING	Throughout the whole BUILDING if any part is regarded as a TALL BUILDING
BUILDING GROUP 1 and 2, except: • **Tourist Accommodation** • **School**	Throughout HABITABLE parts of the BUILDING or FACILITY, and/or parts essential to the safe operation of the BUILDING FUNCTION and its use as an emergency facility, and within fully enclosed EVACUATION ROUTES
BUILDING GROUP 1 and 2: **Tourist Accommodation** and **School**	Within fully enclosed EVACUATION ROUTES
BUILDING GROUP 3, except: • Heritage Buildings	Within fully enclosed EVACUATION ROUTES
BUILDING GROUP 4 and 5	Not required
Aged-Care Building (BUILDING GROUP 2 or 3) with overnight accommodation	Throughout the BUILDING
Commercial Building	In FIRE COMPARTMENTS where: (a) GROSS FLOOR AREA is > 3,500 m^2, or (b) volume is >21,000 m^3
Carpark, other than an open-deck **Carpark**	In FIRE COMPARTMENTS that accommodate >40 vehicles
Health-Care Building used for overnight accommodation	Throughout the BUILDING
Assembly Buildings	Within fully enclosed EVACUATION ROUTES
See Section C8 Smoke Hazard Management for use of sprinklers to satisfy Smoke Hazard Management provisions.	

(b) comply with Specification E1.5 Fire Sprinkler Systems in the Building Code of Australia, Volume 1

(c) comply with AS 4118.2.1 for the piped system, and AS 2118.1, AS 2118.4, AS 2118.5, AS 2118.6, and AS 2118.9 as appropriate, or approved equivalent.

(d) be connected to other features of the FIRE SAFETY SYSTEM

.2 A COMPLIANT SPRINKLER SYSTEM must be a wet system and designed to operate for a prolonged period after the onset of a fire or other DISASTER relative to the FRL of the BUILDING ELEMENTS and BUILDING MATERIALS.

.3 COMPLIANT SPRINKLER SYSTEMS in CARPARKS must be in conformity with Specification E1.5 in the Building Code of Australia, Volume 1, and must:

(a) be independent of the COMPLIANT SPRINKLER SYSTEM protecting any part of the BUILDING not used as a CARPARK, or

(b) if forming part of a COMPLIANT SPRINKLER SYSTEM protecting a part of the BUILDING not used as a **Carpark**, be designed such that the section protecting the non-carpark part can be isolated without interrupting the water supply or otherwise affecting the effective operation of the section protecting the **Carpark**.

C7.E Automatic Fire Suppression Systems

.1 BUILDINGS, FACILITIES and SITES that contain HAZARDOUS SUBSTANCES for storage, use, handling and dispensing must be protected with an AUTOMATIC FIRE SUPPRESSION system designed specifically to suppress and extinguish any fires, burns, toxins, spills or other harmful substances that could result from a DISASTER.

.2 An AUTOMATIC FIRE SUPPRESSION system must consist of the following components appropriate to the type and severity of the potential HAZARD:

(a) COMPLIANT SPRINKLER SYSTEM, and/or

(b) gaseous fire suppression, and/or

(c) condensed aerosol fire suppression, and/or

(d) other suitable means approved by the Government of Samoa

and must be used in all BUILDINGS, FACILITIES and SITES that use, store and fabricate HAZARDOUS SUBSTANCES, or in any other situation deemed appropriate by the Government of Samoa

C7.F Portable Fire Extinguishers and Fire Blankets

.1 PORTABLE FIRE EXTINGUISHERS and FIRE BLANKETS must be provided in all structures in BUILDING GROUPS 1-4 at a rate and frequency suitable to BUILDING size, scale, function, occupancy, FIRE LOAD, and FIRE HAZARD, acceptable to the Government of Samoa.

.2 PORTABLE FIRE EXTINGUISHERS must be appropriate for occupancy, use and contents of the BUILDING, FACILITY or SITE, and:

(a) a minimum size of 2.5 kg

(b) placed in a PUBLIC CORRIDOR, lobby or other suitable public location and:
(i) serve only the STOREY on which they are located
(ii) installed so that the travel distance from the entrance doorway of any **Single Occupancy Unit** to the nearest fire extinguisher is not more than 10 m
(iii) need only be provided in the public / common portion of a **Multiple Unit Residential Building**

.3 A FIRE BLANKET used to smother a fire in an emergency must be of a suitable material and sized appropriate to the expected HAZARD for:

(a) commercial kitchens

(b) BUILDINGS, FACILITIES and SITES containing HAZARDOUS SUBSTANCES or processes that could result in the outbreak of fire

(c) any other location deemed appropriate by SFESA (Samoa Fire and Emergency Services Authority)

.4 PORTABLE FIRE EXTINGUISHERS and FIRE BLANKETS must be placed in suitable locations such as near the potential fire source, along EVACUATION ROUTES, near EMERGENCY EXITS and near indoor PLACES OF SAFETY.

.5 Signage and placement of PORTABLE FIRE EXTINGUISHERS and FIRE BLANKETS must comply with standards of SFESA (Samoa Fire and Emergency Services Authority).

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C7.G Fire Hose Reel

.1 FIRE HOSE REELS must be installed for the BUILDING FUNCTIONS listed in Table C7.G.1 and must comply with AS 2441.

.2 FIRE HOSE REELS must be sufficient in size and capacity to allow occupants to safely undertake an initial attack on a fire appropriate to:

(a) the size of the FIRE COMPARTMENT

(b) the function or use of the BUILDING

(c) the FIRE SAFETY SYSTEM

Table C7.G1: Fire Hose Reels Required per Building Use

OCCUPANCY	FIRE HOSE REEL REQUIRED
Multiple Unit Residential	if > 4 residential STOREYS
Communal Residential >12 persons , **Tourist Accommodation, Aged-Care**	if >2 residential STOREYS
Retail, Industrial, Office, Carpark Storage, Assembly Building	if floor area of any STOREY > 750 m^2, or if >3 STOREYS
Health-Care Building	all BUILDINGS
All BUILDINGS	Wherever an internal HYDRANT is required

.3 FIRE HOSE REELS must be located:

(a) not more than 4m from an EMERGENCY EXIT on each floor of the BUILDING and adjacent to any required HYDRANT

(b) so that the hose will reach every part of the floor including a MEZZANINE, or within a **Single Occupancy Unit** of maximum 2 STOREYS

(c) where system coverage is not achieved by compliance with the above, additional FIRE HOSE REELS must be located in paths of travel to an EMERGENCY EXIT to achieve the required coverage

(d) where COMPLIANT SPRINKLER SYSTEMS are not installed

(e) to serve any FIRE COMPARTMENT with a floor area greater than 500 m^2

.4 FIRE HOSE REELS should not be located within a FIRE-ISOLATED PASSAGEWAY or so that the hose will need to pass through a FIRE DOOR or a SMOKE DOOR except to a SOLE OCCUPANCY UNIT.

.5 Where the normal water supply cannot achieve the flow and pressures required by AS 2441, both a pump and water storage facility must be installed to provide the minimum flow and pressures required by Clause 6.1 of AS 2441.

C7.H Emergency Lighting

.1 All structures in BUILDING GROUP 1-4 must safeguard occupants from injury by:

(a) having adequate lighting upon failure of normal artificial lighting during an emergency

(b) having adequate identification of EXITS and EVACUATION ROUTES

(c) sustaining emergency lighting at the minimum required level for not less than 90 minutes

.2 The following standards for emergency lighting and exit signs must be achieved:

(a) emergency lighting - AS/NZS 2293.1

(b) exit signs - AS/NZS 2293.1

(c) photo-luminescent paint exit sign - Specification E4.8 in the Building Code of Australia, Volume 1

.3 Immediately following a power outage, emergency lighting must provide a level of luminance not less than:

(a) 10% of that required by C7.H.2 above within 1 second of energisation

(b) 80% of that required by C7.H.2 above within 15 seconds of energisation

.4 Emergency lighting system must have a calculated horizontal luminance of not less than:

(a) 0.2 lux at floor level in the path of travel to an EXIT with full illumination achieved within 60 seconds of energisation

(b) 1 lux at each floor level or tread in every required EVACUATION ROUTE and:
- (i) stairway
- (ii) ramp
- (iii) FIRE-ISOLATED PASSAGEWAY

.5 Emergency lighting must be installed:

(a) in every part of an EVACUATION ROUTE
(b) for non-residential, non-storage BUILDINGS where a STOREY has a floor area more than 300 m^2, every STOREY must have emergency lighting installed:
- (i) in every PUBLIC CORRIDOR that is part of a path of travel to an EXIT

(ii) in any room having a floor area more than 100 m^2 that does not:
(A) open to a corridor or space that has emergency lighting, or
(B) open to a road or open space
(iii) in any room having a floor area more than 300 m^2

(c) for any PUBLIC CORRIDOR, lobby or other area in a **Multiple Unit Residential Building**, emergency lighting must be installed where the length from the entrance door of any **Single Occupancy Unit** to the nearest doorway exceeds 6 m and opens directly to:
(i) any part of an EVACUATION ROUTE, or
(ii) an external stairway serving instead of a FIRE-ISOLATED STAIRWAY, or
(iii) an external balcony leading to external stairs

(d) for a **Single Occupancy Unit** in an **Office**, **Commercial, Mixed-Use** or **Assembly Building**, emergency lighting must be installed if:
(i) the GROSS FLOOR AREA of the UNIT is more than 300 m^2
(ii) an EXIT from the UNIT does not open to:
(A) a road or open space, or
(B) an external stairway, passageway, balcony or ramp, leading directly to a road or open space

(e) for a **Commercial** or **Assembly Building**, emergency lighting must be installed in every room or space to which there is public access in every STOREY if:
(i) the GROSS FLOOR AREA in that STOREY is more than 300 m^2, or
(ii) any point on the floor of that STOREY is more than 20 m from the nearest doorway leading directly to a stairway, ramp, passageway, road or open space, or
(iii) egress from that STOREY involves a vertical rise within the BUILDING of more than 1.5 m, or any vertical rise if the STOREY concerned does not admit sufficient light, or
(iv) the STOREY provides a path of travel from any other STOREY required by (i), (ii) or (iii) to have emergency lighting

(f) for a **Health-Care Building**:
(i) in every PUBLIC CORRIDOR serving a treatment area or a ward area
(ii) in every room having a GROSS FLOOR AREA of more than 120 m^2 in a patient care area

(g) in every public area or PUBLIC CORRIDOR in an **Aged-Care Building**

(h) in every FIRE CONTROL CENTRE

C7.I Fire Access Route

.1 Access must be provided to and around a BUILDING, FACILITY and SITE for EMERGENCY RESPONDER vehicles and for EMERGENCY RESPONDERS to perform their duties, and be designed appropriate to:

(a) the function or use of the BUILDING

(b) the FIRE LOAD

(c) the potential FIRE INTENSITY

(d) the FIRE HAZARD

(e) any active FIRE SAFETY SYSTEM installed in the BUILDING

(f) the size of any FIRE COMPARTMENTS

.2 BUILDINGS and FACILITIES must be positioned on the SITE to allow EMERGENCY RESPONDERS to park a vehicle within 45 m of the structure via a FIRE ACCESS ROUTE.

.3 The minimum distance in Section C7.I.2 above for the FIRE ACCESS ROUTE may be increased if the BUILDING is equipped with a COMPLIANT SPRINKLER SYSTEM to the satisfaction of the Government of Samoa.

.4 SITE design must show a dedicated FIRE ACCESS ROUTE that:

(a) consists of all-weather, hard-surface construction with sufficient strength to permit the operation and passage of EMERGENCY RESPONDER vehicles

(b) has a minimum, unobstructed width of 6 m (may include unobstructed public roads, public or private lanes, or other public space)

(c) allows for sufficient turning radii of EMERGENCY RESPONDER vehicles and does not terminate in a dead-end unless sufficient area is provided for vehicles to turn around without difficulty

(d) provides reasonable pedestrian access from the FIRE ACCESS ROUTE to the BUILDING or FACILITY

.5 Where difficult terrain, waterways, non-negotiable grades or other similar conditions prevent a FIRE ACCESS ROUTE from being installed, an alternative means of fire protection must be provided to the satisfaction of the Government. of Samoa.

C7.J Fire Hydrants and Water Supply

.1 Where a RETICULATED WATER SUPPLY is available for the property and EMERGENCY RESPONDERS are available to attend a BUILDING fire at that location, a fire HYDRANT and internal water supply must be provided for BUILDINGS or FACILITIES according to their scale, function and BUILDING GROUP, as indicated in Table C7.J.1.

Table C7.J.1: Hydrant and Water Supply Requirements per Building Function

	Hydrant (external)	Internal Pressurised Water Supply	Wet Riser Main	Dry Riser Main	Wet Fire Hose Reel	Dry Fire Hose Reel
TALL BUILDINGS (greater than 10 STOREYS)	•	•	•		•	
TALL BUILDINGS (4-10 STOREYS)	•	•	where appropriate	where appropriate	•	
BUILDINGS and FACILITIES less than 4 STOREYS						
BUILDINGS that use, store and / or manufacture HAZARDOUS SUBSTANCES	•	•	where appropriate	where appropriate	where appropriate	where appropriate
BUILDING GROUP 1 - 2 (except **Tourist Accommodation, School)**	•	•	where appropriate	where appropriate	•	where appropriate
BUILDING GROUP 2 **Tourist Accommodation, School**	•				•	where appropriate
BUILDING GROUP 3	•					•
BUILDING GROUP 4 except **Minor and Temporary Structures**	•					
BUILDING GROUP 4 **Minor and Temporary Structures** and BUILDING GROUP 5	no requirements					

.2 Fire HYDRANT and internal water supply systems for BUILDINGS, FACILITIES and SITES must be installed in accordance with AS/NZS 2419.1, with the exception of an electricity network substation where one hour water storage is provided and available for firefighting.

.3 External fire HYDRANTS must be located:

(a) not closer than 6 m from a BUILDING or FACILITY requiring fire protection unless protected with a wall having an FRL of 60/60/60 extending at least 2 m on each side and 3 m above the HYDRANTS

(b) not more than 20 m unobstructed distance from hard standing access for FIRE PUMP apparatus

(c) with appropriate SETBACKS from the RETICULATED utilities in adjacent roadways and easements.

.4 For **Multiple Unit Buildings**, internal fire HYDRANTS must serve at least the STOREY on which the level of egress is located, and:

(a) be located such that any point on any STOREY is within reach of a 6 m spray from a 45 m fire hose

(b) be located not more than 4 m from an EXIT and not encroach on the width of the EXIT

(c) serve the second or more STOREYS if the first STOREY is adequately serviced by external HYDRANTS

(d) be provided in each STOREY with a GROSS FLOOR AREA greater than 750 m^2

(e) be provided in every STOREY if the BUILDING contains 4 STOREYS or more and:
  (i) on the roof if the BUILDING is 8 STOREYS or less, except on a roof with a PITCH greater than 10°

.5 Notwithstanding Table C7.J.1, if the length of the fire hose used by EMERGENCY RESPONDERS is insufficient to reach parts of the BUILDING or FACILITY, the BUILDING or FACILITY must be supplied with one, some, or all of the following firefighting equipment appropriate to the BUILDING FUNCTION and HEIGHT as per Table C7.J.1:

(a) external fire HYDRANT

(b) internal pressurised water supply

(c) wet or dry RISER MAINS

(d) wet or dry FIRE HOSE REELS

.6 For BUILDING GROUP 2, **Assembly**, **Health-Care**, **Aged-Care** and **Tourist Accommodation Buildings** must have a backup water supply on SITE that is reserved for emergencies, and be sufficient in size to accommodate potential fires, DISASTERS and emergencies appropriate to the size, function and occupancy of the BUILDINGS, as well as the FIRE HAZARD and FIRE INTENSITY.

C7.K Fire Control Panel

.1 A FIRE CONTROL PANEL must be provided for all structures in BUILDING GROUPS 1-4, except for the following in BUILDING GROUP 4:

(a) **Communal Residential**

(b) **Fale Tourist Accommodation**

(c) **Retail**

(d) **Minor and Temporary Structures**

(e) **School**

.2. The extent of monitoring, safety and devices for controlling the spread of fire in the FIRE CONTROL PANEL must be appropriate to:

(a) BUILDING type, scale, function and occupancy

(b) potential FIRE HAZARD or DISASTER

(c) characteristics of the FIRE SAFETY SYSTEM

.3 The FIRE CONTROL PANEL must have the ability to:

(a) be the mechanism through which all components of the FIRE SAFETY SYSTEM are connected together

(b) monitor changes associated with fire, smoke, and/or release of toxic air-borne substances

(c) monitor operational integrity and AUTOMATIC control of equipment

(d) coordinate all aspects of the warning systems - fire, smoke and toxic substances alarms, audio or visual

(e) operate switches and controls for manual manipulation of the FIRE SAFETY SYSTEM

(f) enable / disable fire suppression systems, AUTOMATIC FIRE DOORS, SMOKE DOORS and EMERGENCY EXIT doors, and activating SMOKE CONTROL SYSTEMS

.4 The FIRE CONTROL PANEL must be placed in a FIRE-RESISTANT enclosure, be easily accessible from the ground floor for EMERGENCY RESPONDERS, and not be located in an EVACUATION ROUTE. For TALL BUILDINGS and other BUILDINGS deemed appropriate by the Government of Samoa, it may be located within a FIRE CONTROL CENTRE (see Section C8.D.

.5 The FIRE CONTROL PANEL must be connected to an SFESA (Samoa Fire and Emergency Services Authority) operating panel so the Government of Samoa is immediately notified of an emergency situation.

.6 A FIRE CONTROL PANEL must be housed in a FIRE CONTROL CENTRE (see Section C8.D of the NBC) for the following:

(a) TALL BUILDINGS

(b) BUILDINGS, FACILITIES and/or SITES that use, store or fabricate HAZARDOUS SUBSTANCES

(c) BUILDINGS, FACILITIES and SITES in BUILDING GROUP 1-2, except Tourist Accommodation unless the GROSS FLOOR AREA is greater than 2,500 m^2

C7.L Building Access for Emergency Responders

.1 An unobstructed path from the FIRE ACCESS ROUTE to at least one side of each FIRE COMPARTMENT with an EMERGENCY EXIT, or to appropriate EXITS in a **Single Unit Residential Building** must be provided.

.2 Structures in BUILDING GROUP 1-3 that are greater than 3 STOREYS in HEIGHT must provide access to the roof via an external stairway connecting to the ground plane and include a sign indicating it is an EVACUATION ROUTE.

.3 **Multiple Unit Residential Buildings** and all other non-residential BUILDINGS must ensure that roof access is not obstructed by any security barrier such as fencing, CABLE, aerial, antenna, or other obstruction that would be impeded the operations of EMERGENCY RESPONDERS in the event of fire or other emergency.

C7.M Fire Safety and Evacuation Plans and Employee Training

.1 An approved FIRE SAFETY AND EVACUATION PLAN must be prepared and maintained for structures in BUILDING GROUPS 1 - 4 with provisions related to fire and any other HAZARD as described in Section E.

.2 The FIRE SAFETY AND EVACUATION PLAN must include the following:

(a) procedures for reporting a fire or other emergency to the fire department or designated emergency response organisation

(b) procedures for notifying, relocating or evacuating occupants, including people who need assistance

(c) identification of emergency egress and EVACUATION ROUTES and whether evacuation of the BUILDING is to be complete or, where approved, by selected floors or areas only

(d) procedures for occupants who must remain to operate critical equipment before evacuating

(e) procedures for accounting for employees and occupants after evacuation has been completed

(f) identification and assignment of personnel responsible for rescue or emergency medical aid

(g) a description of the emergency voice / alarm communication system alert tone and preprogrammed voice messages, where provided

(h) list of major FIRE HAZARDS associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures

(i) identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires

(j) identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel HAZARD sources

(k) fire safety training procedures for employees for the following:

- (i) awareness of the FIRE HAZARDS and potential DISASTERS associated with BUILDINGS, FACILITIES and the SITE, and fire prevention techniques
- (ii) evacuation training - employees must be familiarised with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, location of EVACUATION ROUTES, PLACES OF SAFETY, and procedures for evacuation

(iii) emergency lockdown training - where a BUILDING or FACILITY has a lockdown plan, employees must be trained on their assigned duties and procedures in the event of an emergency lockdown

(iv) fire safety training - employees assigned firefighting duties must be trained to know the locations and proper use of PORTABLE FIRE EXTINGUISHERS or other manual fire-fighting equipment and the protective clothing or equipment required for its safe and proper use

.3 Drawings that are part of the FIRE SAFETY AND EVACUATION PLAN must include the following:

(a) site plans indicating the following:
- (i) occupancy assembly point / PLACES OF SAFETY
- (ii) locations of fire HYDRANTS and/or other water supply sources
- (iii) FIRE ACCESS ROUTE

(b) floor plans identifying the locations of the following:
- (i) EXITS
- (ii) EVACUATION ROUTES
- (iii) ACCESSIBLE EVACUATION ROUTE
- (iv) PLACES OF SAFETY
- (v) MANUAL FIRE ALARM BOXES, AUTOMATED FIRE ALARMS
- (vii) PORTABLE FIRE EXTINGUISHERS and AUTOMATED FIRE SUPPRESSION systems
- (viii) FIRE HOSE REELS
- (ix) RISER MAINS, water supply pipes and valves, HYDRANTS and COMPLIANT SPRINKLER SYSTEMS
- (x) SMOKE ALARM, SMOKE DETECTORS and SMOKE CONTROL SYSTEM
- (xi) FIRE CONTROL PANEL and FIRE CONTROL CENTRE
- (xii) known and potential fire sources

C7.N Emergency Intercom And Sound Systems

.1 The following BUILDINGS must have an intercom and sound system for emergency purposes complying where applicable with AS/NZS 1670.4 installed:

(a) TALL BUILDINGS

(b) in a **Multiple Unit Residential Building** with a maximum of 2 STOREYS and used as:
- (i) the residential part of a **School**, or
- (ii) accommodation for the aged, children or a PERSON WITH A DISABILITY

(c) in an **Aged-Care Building,** except that the system:
- (i) must be arranged to provide a warning for occupants
- (ii) in areas used by the residents, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of residents

(d) in a **Health-Care Building** having a GROSS FLOOR AREA of more than 1,000 m^2 or more than 2 STOREYS, and the system:
- (i) must be arranged to provide a warning for occupants
- (ii) in a ward area, may have its alarm adjusted in volume and content to minimise trauma consistent with the type and condition of patients

(e) in an **Assembly Building**:
- (i) used as a **School** and greater than 3 STOREYS, or
- (ii) used as a theatre, public hall, or the like, having a floor area more than 1,000 m^2 or greater than 2 STOREYS

C7.0 Fire Windows

.1 A FIRE WINDOW may be installed as part of the FIRE SAFETY SYSTEM as a means to provide access to and from the BUILDING or FACILITY for EMERGENCY RESPONDERS.

.2 A FIRE WINDOW must have the required FRL appropriate to the BUILDING MATERIAL and function, and be:.

(a) AUTOMATIC closing or permanently fixed in the closed position, or

(b) the opening must be protected with –/60/– AUTOMATIC FIRE SHUTTERS

.3 The room containing the FIRE WINDOW must be protected by:

(a) internal or external wall-wetting sprinkler, or

(b) a COMPLIANT SPRINKLER SYSTEM

.4 A FIRE WINDOW must be sized to allow an average sized EMERGENCY RESPONDER carrying equipment to safely pass through the FIRE WINDOW.

ACCEPTABLE SOLUTIONS

AS 1670: 1986 Fire Detectors in Exhaust Ducts
AS 2118: 1999 Automatic Fire Sprinkler Systems
Part 1: General Requirements
Part 4: Sprinkler Protection for Accommodation Buildings not Exceeding Four Storeys
Part 6: Combined Sprinkler and Hydrant Systems in Multi-Storey Buildings
AS 1851: 2005 Maintenance of Fire Protection Equipment
AS 2293: 2005 Emergency Escape Lighting and Exit Signs for Buildings
AS 2444: 2001 Portable Fire Extinguishers and Fire Blankets - Selection and Location
AS 3786: 2014 Smoke Alarms Using Scattered Light, Transmitted Light or Ionisation

AS/NZS 1670: 2004 Fire Detection, Warning, Control and Intercom Systems
Part 1: Fire
Part 2: Fire Alarm Monitoring
Part 4: Sound Systems and Intercom Systems for Emergency Purposes
AS/NZS 3837: 1998 Method of Test for Heat and Smoke Release Rate Using an Oxygen Consumption Calorimeter

NZS 2139: 1967 Heat Activated Fire Detectors
NZS 4231: 1985 Specification for Self-Luminous Exit Signs, Amend: A
NZS 4512: 2010 Fire Detection and Alarm Systems in Buildings
NZS 4514: 2009 Inter-Connected Smoke Alarms for Houses
NZS 4515: 2009 Fire Sprinkler Systems for life Safety in Sleeping Occupancy (up to 2,000 m^2)
NZS 4541: 2013 Automatic Fire Sprinkler Systems
NZS 6742: 1971 Code of Practice for Emergency Lighting in Buildings

BS 5446: 2000 Components of Automatic Fire Alarm Systems for Residential Premises
BS EN 12101: 2005 Smoke and Heat Control Systems
Part 1: 2005 Specification for Smoke Barriers
BS EN 14604: 2005 Smoke Alarm Devices

ISO 12239: 2003 Fire Detection and Fire Alarm Systems - Smoke Alarms
ISO 13571: 2007 Life-threatening Components of Fire - Guidelines for the Estimation of Time Available for Escape

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

Building Code of Australia, Volume 1

Specification G3.8 Fire and Smoke Control Systems in Containing Atria
Specification E1.5 Fire Sprinkler Systems
Specification E1.8 Fire Control Centres
Specification E2.2a Smoke Detection and Alarm System
Specification E2.2b Smoke Exhaust Systems
Specification E4.8 Photo-Luminescent Exit Signs

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Construction Drawings must show details of FIRE SAFETY SYSTEM, including fire and smoke alarm and detection system, COMPLIANT SPRINKLER SYSTEM if used, emergency lighting, fire safety in any lifts and fire extinguishing features as appropriate for the BUILDING use, type of construction and BUILDING GROUP

- Construction Documents must indicate that a Fire Safety Plan and a Fire Evacuation Plan will be completed and approved by the Government of Samoa before OCCUPANCY PERMIT and/or Final Completion Certificate is issued

C8 Fire Safety Systems - Tall Buildings, Atria and Mezzanines

REQUIRED PERFORMANCE

THE FOLLOWING PROVISIONS APPLY SPECIFICALLY TO TALL BUILDINGS GREATER THAN 4 STOREYS IN HEIGHT, AND ONE-STOREY BUILDINGS CONSTRUCTED WITH AN EXTENDED CEILING FORMING AN ATRIUM OR MEZZANINE. COMPLIANCE WITH OTHER SECTIONS IN THE NBC IS MANDATORY.

PROVISIONS FOR RISER MAINS IN SECTION C8.B RISER MAINS AND WATER SUPPLY, APPLY TO ANY SIZE OR TYPE OF BUILDING USING THIS METHOD OF FIRE PROTECTION.

.1 Design and installation of a SMOKE CONTROL SYSTEM in TALL BUILDINGS, ATRIA and MEZZANINES must result in the provision of a tenable environment and viable EVACUATION ROUTE during the time required for evacuation during a fire, DISASTER or other emergency.

.2 TALL BUILDINGS, ATRIA and MEZZANINES must have natural and/or mechanical ventilation as part of the SMOKE CONTROL SYSTEM for each floor that releases to the outside air.

.3 In the event of a fire in a TALL BUILDING, ATRIUM or MEZZANINE, the EVACUATION ROUTE and the period of time occupants take to evacuate must be appropriate to:

(a) the number, mobility and other characteristics of the occupants

(b) the function or use of the BUILDING

(c) the travel distance and other characteristics of the BUILDING

(d) the FIRE LOAD

(e) the potential FIRE INTENSITY

(f) the FIRE HAZARD

(g) any active FIRE SAFETY SYSTEMS installed in the BUILDING

(h) EMERGENCY RESPONDER operations

.4 Air handling systems must be such that smoke is not transported from a FIRE SOURCE to EVACUATION ROUTES, other STOREYS, or from one FIRE COMPARTMENT to another, in a concentration that might affect the safety of the occupants or hinder the work of EMERGENCY RESPONDERS.

.5 TALL BUILDINGS, ATRIA, MEZZANINES and **Stadiums** must be provided with means of giving clear information to enable EMERGENCY RESPONDERS to:

(a) establish the general location of the fire

(b) identify the FIRE SAFETY SYSTEMS available in the BUILDING or FACILITY

(c) establish the presence of HAZARDOUS SUBSTANCES or processes and emergency procedures for each

C8.A Smoke Control System

.1 A SMOKE CONTROL SYSTEM in TALL BUILDINGS, ATRIA and MEZZANINES must safeguard people from harmful effects of smoke during a fire, DISASTER or emergency and allow safe passage of people through an EVACUATION ROUTE to a PLACE OF SAFETY by providing an effective combination of:

(a) compartmentation (see Section C3) that divides BUILDINGS into smaller zones that constrain spread of smoke and toxic gases to confined areas

(b) dilution of smoke and toxic gases through the air handling (HVAC) system

(c) pressurisation of EVACUATION ROUTES to allow safe passage during a fire, DISASTER or emergency

(d) buoyancy allowing smoke and toxic gases to rise naturally in large open areas such as ATRIA, MEZZANINES and **Stadiums**, or through mechanical influences so that they may be vented to the outside air

(e) ventilation using a natural or mechanical system designed to direct smoke and toxic gases to vent to the outside air

(f) compliance with all other Fire Protection provisions in the NBC

.2 A SMOKE CONTROL SYSTEM must involve any, some, or all of the following methods:

(a) pressurisation method

(b) airflow design method - natural or mechanical ventilation, or a combination

(c) exhaust method

.3 Overriding manual controls for the SMOKE CONTROL SYSTEM for EMERGENCY RESPONDERS must be installed outside of the BUILDING in a suitable protective enclosure, and/or located in the FIRE CONTROL CENTRE.

.4 Pressurised vertical ventilation SHAFTS may be created in stairwells or a separated, dedicated SHAFT equipped with mechanical air movement devices (fans) and/or automatic openings activated by any device in the FIRE SAFETY SYSTEM when using natural ventilation.

.5 Natural ventilation for smoke control must have appropriate placement of windows, doors, vents, and be

(a) as evenly distributed as practicable

(b) easily opened and/or opened automatically when activated by a device in the FIRE SAFETY SYSTEM

.6 Roof vents that are part of a SMOKE CONTROL SYSTEM must comply with AS 2665 except that:

(a) smoke curtains may divide the space below the roof in compartments with area < 1,500 m^2

(b) all roof vents within the same FIRE COMPARTMENT must open at the same time

(c) roof vents must be activated by:
   (i) COMPLIANT SPRINKLER SYSTEM, or
   (ii) AUTOMATIC FIRE ALARM, or

(iii) SMOKE DETECTORS spaced not more than 30 m apart and 15 m from any smoke curtain and with not less than one detector for each 500 m^2 of GROSS FLOOR AREA, or

(iv) heat detectors spaced not more than 15 m apart and 7.5 m from any smoke curtain and with not less than one detector for each 250 m^2 of GROSS FLOOR AREA

.8 A mechanical smoke exhaust system must comply with Specification E2.2b Smoke Exhaust Systems in the Building Code of Australia, Volume 1, and have a separate and/or designated power supply that will operate in the event of a fire, DISASTER or other emergency.

.9 Pressurisation systems for EVACUATION ROUTES, service and ventilation SHAFTS, elevators, stairwells, lobbies, etc. must:

(a) comply with AS/NZS 1668.1: 2015, as amended

(b) not allow openable windows or other openable devices (other than necessary doorways, pressure-controlled relief louvres and window openable by a key

(c) not serve more than one EVACUATION ROUTE in a BUILDING or FACILITY, or form part of any other air handling system

.10 Natural ventilation of ATRIA and MEZZANINES, and/or ventilation SHAFTS or stairwells must be:

(a) activated by an appropriate smoke detection device such as a light beam transmitter and cause all vents to open simultaneously

(b) have all vents appropriately sized and placed

(c) modelled and tested for effectiveness based on the size and height of the ventilated space, outside air temperature and usual wind conditions, and expected EVACUATION TIME

.11 The air handling system in a SMOKE CONTROL SYSTEM must:

(a) locate air intakes below openings from which smoke might flow, such as BUILDING exhausts, smoke SHAFT outlets and elevator vents

(b) provide AUTOMATIC shutdown capability to stop the system in the event of smoke feedback

.12 The SMOKE CONTROL SYSTEM must include a Control Panel that allows EMERGENCY RESPONDERS to take manual control of the FIRE SAFETY SYSTEM, and include:

(a) a map of the BUILDING showing FIRE COMPARTMENTS, smoke control zones and location of FIRE SAFETY SYSTEM equipment

(b) panel locations, power requirements, power sources, and interconnecting WIRING requirements

(c) status lights showing the operational condition of smoke control equipment, vents and other devices

(d) manual switches for the SMOKE CONTROL SYSTEM that override AUTOMATIC controls

C8.B Riser Mains and Water Supply

.1 TALL BUILDINGS must have a RISER MAIN system separate from the main water supply, intended solely for use by EMERGENCY RESPONDERS in response to an emergency and be in compliance with AS 2491.1: 2005 Fire Hydrant Installation.

.2 All RISER MAINS (wet or dry) must:

(a) be capable of supplying water at the flow rates and pressures necessary for the satisfactory operation of the required fire-fighting equipment

(b) not incorporate plastic pipes above ground

(c) have fire service inlet connections located in locked cabinets accessible only to EMERGENCY RESPONDERS

(d) if the system is fitted with a pressure gauge, the gauge must comply with AS 1349 and have a full scale reading of not less than 25% more than the pressure to which the system has been hydrostatically tested

.3 A RISER MAIN serving only FIRE HOSE REELS may be connected to a metered supply if:

(a) the required flow rate and pressure can be maintained at the most hydraulically disadvantaged FIRE HOSE REEL

(b) the water meter and street supply to the property have a normal diameter of not less than 32 mm

(c) water supply pipework reticulation arrangements comply with Figure C9.D.3 or a similar arrangement

(d) any system valve which can isolate flow in the FIRE MAIN is secured in the open position by a padlocked metal strap

.4 Water supply for COMPLIANT SPRINKLER SYSTEMS must satisfy the requirements of NZS 4541 regarding:

(a) minimum required discharge and design flow relative to the FIRE HAZARD

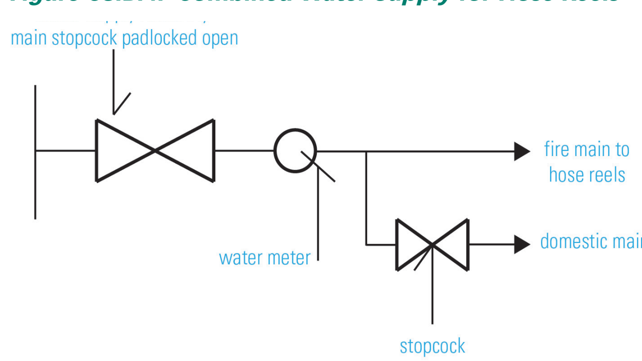
(b) water supply, storage, pumps, tanks inlet and hydraulic design requirements

(c) sprinkler type and spacing, pipework, valves, gauges, alarm and warning devices

(d) installation, routine testing, maintenance and inspections

and must be separate from the water supply for RISER MAINS that service FIRE HOSE REELS, or if combined, must have adequate rates of flow for both systems as illustrated in Figure C8.B.4

Figure C8.B.4: Combined Water Supply for Hose Reels



.5 Locked cabinets for fire service inlet connections may be located:

(a) in the EXTERNAL WALL of a BUILDING if they are within sight of the main entrance, and for non-residential BUILDINGS if they are separated from the BUILDING by construction having a FRL of 60/60/30 for not less than 2 m each side of and above the top of the cabinet, or

(b) remote from the BUILDING if they are at the property boundary, within sight of the main entrance to the BUILDING, adjacent to the principal vehicular access to the property and located not less than 10 m from the EXTERNAL WALL, or

(c) in any other location acceptable to the Government of Samoa if the two options above are not possible

.7 The locked cabinet must contain a detailed, water-resistant plan (fabricated of engraved, anodised aluminium, or equivalent), displayed in a prominent position within the locked cabinet, that shows the following information:

(a) the layout of the BUILDING and adjacent streets

(b) the layout, location and size of fire HYDRANT and RETICULATED WATER SUPPLY systems, including property boundaries, fire HYDRANTS, FIRE HOSE REEL connections, street and allotment isolating and non-return valves, pumps and tanks

(c) the operational discharge pressure and pressure at zero flow of any pump installed in the system

(d) the capacity of any tank connected to the system

(e) the height of the highest HYDRANT outlet above the lowest booster inlet connection

C8.C Fire Pump and Enclosure

.1 A FIRE PUMP must be part of the FIRE SAFETY SYSTEM in TALL BUILDINGS and other BUILDINGS, FACILITIES and SITES deemed appropriate by the Government of Samoa, and be:

(a) located in a room or enclosure with a FRL of 60/60/30

(b) within the BUILDING or FACILITY, or

(c) be external but not within 6 m of the BUILDING and/or any fire source

.2 Size and location of the FIRE PUMP and boosters must be sufficient to provide adequate water supply for firefighting to all parts of the BUILDING, FACILITY and SITE that needs fire protection.

.3 FIRE HOSE REELS that connect to a FIRE PUMP must be linked to an independent tank and pressurised (if pressure is pumped by an electrical pump), and have an automatic back up.

.4 FIRE PUMPS must be equipped to operate in the event of a power outage.

.5 A FIRE PUMP enclosure must provide suitable access and visibility to the equipment, and be protected by FIRE-RESISTING construction and a COMPLIANT SPRINKLER SYSTEM if located internally to the BUILDING or FACILITY.

.6 A FIRE PUMP must be a high pressure, self-priming, centrifugal pump that conforms with AS 2941:2013 Fixed Fire Protection Installation, and be periodically tested and maintained to remove solids and abrasive materials.

.7 A FIRE PUMP must be capable of emitting water at a pressure sufficient to reach all parts of a BUILDING, FACILITY, or SITE that require fire protection based on:

(a) water supply type, location and pressure

(b) size and quality of fire hoses used by SFESA

(c) size and quality of fire hoses supplied in the BUILDING, FACILITY or SITE

(d) size, location and capacity of FIRE PUMP boosters, if used

.8 If connected to a RETICULATED WATER SUPPLY, a FIRE PUMP must have valves that isolate the water supply for firefighting from the water supply for the BUILDING, FACILITY or SITE

.9 Where a tank is used as the water supply for a FIRE PUMP, it must be sized so that the storage capacity can provide a minimum duration of 15 minutes of water for the FIRE PUMP to operate effectively.

C8.D Fire Control Centre

.1 TALL BUILDINGS must have a FIRE CONTROL CENTRE containing the FIRE CONTROL PANEL (see Section C7.I), and be designed, constructed and operated in compliance with Specification E1.8 Fire Control Centres in the Building Code of Australia, Volume 1, as amended.

.2 A FIRE CONTROL CENTRE must:

(a) provide an enclosed area of FIRE-RESISTANT construction fitted with a COMPLIANT SPRINKLER SYSTEM from which fire-fighting operations or other emergency procedures can be directed or controlled

(b) contain the main control mechanism, panels, telephones, furniture, equipment and the like associated with the required fire services in the BUILDING

(c) not be used for any purpose other than the control of fire-fighting activities and other measures concerning the occupant safety or security

(d) supply power to detection devices, transponders, off-premises transmitters, or Notification Appliances

(e) contain relays, devices and manual shut-off mechanisms for fire suppression systems and other safety features including all components of the EVACUATION ROUTE

.3 Where space and sufficient access exists, the FIRE CONTROL CENTRE should be located external to the BUILDING and provide easy access for EMERGENCY RESPONDERS, or installed in a location internal to the structure that is easily accessed from the ground floor.

.4 The FIRE CONTROL CENTRE must contain all information and mechanisms for EMERGENCY RESPONDERS to effectively suppress and extinguish a fire in a BUILDING, FACILITY or on the SITE.

.5 The FIRE CONTROL CENTRE must consist of a separate room with a door, and be constructed with a FRL appropriate for Construction Type A (see Table C5.D.1 and Table C5.E.1).

.6 If restricted access to a FIRE CONTROL CENTRE is used as a security measure, instructions on how to access it must be provided in writing to the Government of Samoa prior to the issuance of the OCCUPANCY PERMIT.

ACCEPTABLE SOLUTIONS

AS 1349: 1986 Bourdon Tube Pressure and Vacuum Gauges
AS 2441: 2005 Installation of Fire Hose Reels
AS 2941: 2013 Fixed Fire Protection Installation
AS 2665: 2001 Smoke / Heat Venting Systems - Design, Installation and Commissioning
AS 3786: 2014 Smoke Alarms Using Scattered Light, Transmitted Light or Ionisation

AS/NZS 1668.1: 2015 The Use of Ventilation and Air conditioning in Buildings: Fire and Smoke Control

ISO 13571: 2007 Life-Threatening Components of Fire - Guidelines for the Estimation of Time Available for Escape

NZS 4541: 2013 Automatic Fire Sprinkler Systems

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

Building Code of Australia, Volume 1
Specification E1.8 Fire Control Centres
Specification E2.2b Smoke Exhaust System
Specification G3.8 Fire and Smoke Control Systems in Containing Atria

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Construction Drawings must show details of smoke alarm and detection system, COMPLIANT SPRINKLER SYSTEM if used, emergency lighting and exit sign details, fire safety in any lifts and fire extinguishing features as appropriate for the BUILDING use, type of construction and BUILDING GROUP
- Construction Documents must indicate that a FIRE SAFETY AND EVACUATION PLAN will be completed and approved by the Government of Samoa before an OCCUPANCY PERMIT and/or Final Completion Certificate is issued

Section D

Access

Contents

Table D1 - Section D - Overview of Applicable Sections in the NBC

Section D

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group					Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
		1	2	3	4	5										
D1 Accessibility for People with Disabilities																
D1.A	Sensory Accessibility	•	•	•	•		•		•	•	•	•	•	•		•
D1.B	Outdoor Accessibility	•	•	•	•		•		•	•	•	•	•	•		•
D1.C	Indoor Accessibility	•	•	•	•		•		•	•	•	•	•	•		•
D2 Automated Access																
D2.A	Lifts	•	•	•	•		•		•	•		•	•	•		•
D2.B	Elevators, Moving Walkway and Automated Ramps	•	•	•	•		•		•	•		•	•	•		•
D3 Egress and Movement																
D3.A	Number, Location and Type of Exits	•	•	•	•		•		•	•	•	•	•	•		•
D3.B	Emergency Exits	•	•	•	•		•		•	•	•	•	•	•		•
D3.C	Doors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
D3.D	Protection from Falling	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
D3.E	Stairways	•	•	•	•	•	•		•	•	•	•	•	•	•	•
D3.F	Handrails, Balusters and Glass Panels	•	•	•	•		•		•	•	•	•	•	•		•
D3.G	Ramps	•	•	•	•		•		•	•	•	•	•	•		•
D3.H	Window Fall Protection and Human Impact Safety	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
D3.I	Roof Access	•	•	•	•		•		•	•		•	•	•		•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

Section D OBJECTIVES

D(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, and SITEWORK must:

(a) safeguard people from injury during movement into, within, and out of BUILDINGS and SITES

(b) safeguard people from injury resulting from the movement of vehicles on the SITE

(c) ensure that a PERSON WITH A DISABILITY is able to approach a BUILDING, FACILITY, and SITE, enter it and adequately carry out activities and functions where required to be ACCESSIBLE

D1 Accessibility for People with Disabilities

REQUIRED PERFORMANCE

.1 BUILDINGS and SITES required to provide functional use of the built environment for all people, including a PERSON WITH A DISABILITY, include those in BUILDING GROUP 1-3, and BUILDING GROUP 4 (except **Fale Tourist Accommodation** (overnight accommodation FALES only)), with the following exceptions:

(a) **Minor** and **Temporary Buildings**

(b) non-habitable public works FACILITIES such as towers, solar power generator fields, DRAINAGE AREAS and OUTFALLS, but excluding bridges that are intended to convey pedestrians

(c) areas where access would be inappropriate because of the particular purpose for which the area is used.

and will be referred to as a REQUIRED ACCESSIBLE BUILDING for the remainder of this Section and throughout the NBC

.2 REQUIRED ACCESSIBLE BUILDINGS must provide access and use of the BUILDING and SITE to a PERSON WITH A DISABILITY according to:

(a) function, scale, layout, use and occupancy of the BUILDING and SITE acceptable to the Government of Samoa, and/or

(b) provisions in Table D1.1 and Table D1.2, and

(c) Samoa's Disability Access Guideline, 2008, published by PUMA, and any amendments or related documents published and approved by the Government of Samoa

.3 REQUIRED ACCESSIBLE BUILDINGS that have multiple RESIDENTIAL UNITS or short-term overnight accommodation UNITS must have a total number of ACCESSIBLE UNITS that complies with Table D1.2:

Table D1.2 Accessible Occupancy Units in Multiple Unit Buildings

BUILDING SIZE	Number of Accessible Units Required
1-4 **Single Occupancy Units**	n.a.
5-10 **Single Occupancy Units**	1
11-40 **Single Occupancy Units**	2
41-60 **Single Occupancy Units**	3
61-80 **Single Occupancy Units**	4
81-100 **Single Occupancy Units**	5

Table D1.1 Accessibility Requirements per Building Group

	Building Group Number	Structures	Access for Persons with a Disability
1	BUILDINGS, FACILITIES or **Major Infrastructure** whose function serves a large area or large number of people in Samoa	• **Major Infrastructure**, including hydroelectric dams and other dams whose failure would result in loss of human life, SEAWALLS, ports, bridges and tunnels • Extremely HAZARDOUS facilities adjacent to large populations • BUILDINGS having critical national defence functions • power generating stations, solar installations and other utilities required for emergency backup • aviation control towers, air traffic control centres, and emergency aircraft hangars • water treatment facilities required to maintain water pressure for fire suppression and/or supply drinking water	• in publicly ACCESSIBLE places (parking, ACCESSIBLE ROUTE, EXIT, lobby, common areas, BATHROOM
2	BUILDINGS and FACILITIES that are essential to post-DISASTER recovery or the primary function is storage or handling of HAZARDOUS SUBSTANCES BUILDINGS with activities that affect large groups of people in a village	• hospitals and other **Health-Care Buildings** having surgery or emergency treatment facilities • fire, rescue and police stations, and emergency vehicle garages • BUILDINGS used as emergency shelters • BUILDINGS used for communication and operation centres in an emergency, and other facilities for emergency response • BUILDINGS in which the use, storage or handling of HAZARDOUS SUBSTANCES capable of causing acutely HAZARDOUS conditions that extend beyond property boundaries • **Tourist Accommodation** (a BUILDING with more than 8 guest rooms) • accommodation for the aged, disabled, disadvantaged or children (greater than 250 m^2) • **School** with more than 30 students, including classrooms, laboratories, gymnasiums, halls and ablutions	• in publicly ACCESSIBLE places (parking, ACCESSIBLE ROUTE, EXIT, lobby, common areas, BATHROOM • throughout **Aged-Care** and **Health-Care Buildings** • **Tourist Accommodation** - at least 1 ACCESSIBLE UNIT (guest room) as per Table D1.2 • **Schools** - ACCESSIBLE ROUTE to common areas, ACCESSIBLE classrooms and BATHROOMS on the ground floor
3	BUILDINGS which may house groups of people, vulnerable populations, or fulfil a role of importance to the community or village	• **Communal Residential Buildings** (greater than 350 m^2) • **Multiple Unit Residential Building** (with more than 4 UNITS) • **Assembly Buildings** (greater than 150 m^2) • **Tourist Accommodation** (a BUILDING with 1-8 guest rooms) • **Aged-Care Building** accommodation for disabled and/or the elderly (250 m^2 or less) • **Office** / **Commercial** (greater than 350 m^2) • **Mixed Use Buildings** (greater than 350 m^2) • **Industrial** / **Storage Buildings** (greater than 350 m^2) • **Heritage Buildings**	• in publicly ACCESSIBLE places (parking, ACCESSIBLE ROUTE, EXIT, lobby, common areas, BATHROOM • throughout **Aged-Care** and **Health-Care Buildings** • **Tourist Accommodation** - at least one ACCESSIBLE ROUTE from lobby to common areas
4	BUILDINGS which accommodate a low number of people, or with a low replacement cost	• **Communal Residential Building** (350 m^2 or less) • **Multiple Unit Residential Building** (4 UNITS or less) • **Assembly Buildings** (150 m^2 or less) • **Fale Tourist Accommodation** (other than **Open Fales** which are not subject to the NBC) • **Retail** and kiosk-type shop (50 m^2 or less) • **Office** / **Commercial** (350 m^2 or less) • **Mixed Use Building** (350 m^2 or less) • **Industrial** / **Storage Buildings** (350 m^2 or less) • **Minor** and **Temporary Structures** • **School** housing two classrooms or less	• ACCESSIBLE PARKING - all BUILDINGS except **Retail, Minor** and **Temporary Structures, Schools** • All BUILDINGS must have an ACCESSIBLE ROUTE from a parking area or public sidewalk to the front entrance only, except **Minor** and **Temporary Structures**
5	Samoan **Fales** and **Single Unit Residential**	• **Open Fale (faleo'o)** - BUILDING PERMIT not required • **Regulated Fale** • **Single Unit Residential**	• in publicly ACCESSIBLE places (parking, ACCESSIBLE ROUTE, EXIT, for **Regulated Fales** used for commercial or assembly purposes • see D1.6 for **Single Unit Residential**

.4 REQUIRED ACCESSIBLE BUILDINGS must provide at least one ACCESSIBLE ROUTE based on the use of the BUILDING or SITE to:

(a) allow safe approach, entry and egress from the BUILDING or FACILITY to the point of entry to the SITE

(b) safely move within the BUILDING or SITE to common/public/work areas and ACCESSIBLE UNITS, and within the property to amenities and ACCESSIBLE public BATHROOMS

.5 REQUIRED ACCESSIBLE BUILDINGS that have a public use and are greater than one STOREY in HEIGHT must have ACCESSIBLE means (lift, ramp, or the like) of reaching upper STOREYS, except for:

(a) **Communal Residential, Multiple Unit Residential,** and **Tourist Accommodation Buildings** where an ACCESSIBLE UNIT has been provided on the ground floor, unless other ACCESSIBLE UNITS are located on upper STOREYS

(b) **Heritage Buildings** - where the lift would distract from the authenticity and heritage value of the BUILDING

.6 All **Residential** BUILDINGS in BUILDING GROUP 5 except **Open Fales** must have:

(a) at least one ACCESSIBLE EXIT (BUILDING entrance of sufficient size to allow safe movement of wheelchairs)

(b) at least one BATHROOM with an ACCESSIBLE doorway and a clear area of 0.9 m x 1.2 m in front of the TOILET and SANITARY FIXTURES

DEEMED-TO-SATISFY PROVISIONS

D1.A Sensory Accessibility

.1 BUILDINGS and SITES required to be ACCESSIBLE must provide information to a PERSON WITH A DISABILITY regarding safe usage by way of signs, displays, maps, audio recordings and the like.

.2 **Assembly Buildings**, **Retail, Commercial** and **Industrial** in BUILDING GROUPS 1-3 required to be ACCESSIBLE must provide a map/information/audio display in an appropriate location illustrating the following ACCESSIBLE items:

(a) ACCESSIBLE ROUTES, EVACUATION ROUTES, and EMERGENCY EXITS in the BUILDING

(b) ACCESSIBLE sanitation facilities and BATHROOMS

and must:

(c) be situated at a height so that it can be easily read by a person in a wheelchair

(d) be protected from reflected glare

(e) use lettering that is visible to a person with normal sight who would be viewing the map/information display from 1,000 mm away

(f) use plain characters, 5 mm high minimum, which contrast well with the background

(g) use Braille and/or audio devices for people with visual impairments

(h) use strategically placed signage for people with hearing impairments

.3 Public access terminals, such as automated teller machines, information systems, phone booths, and sale counters in a REQUIRED ACCESSIBLE BUILDING must provide an ACCESSIBLE entrance and exit, and ACCESSIBLE use of terminals and their function with regard to:

(a) appropriate height to accommodate people in wheelchairs

(b) appropriate signage for people with a visual impairment

(c) appropriate conveyance of information for a PERSON WITH A DISABILITY

.4 Braille signs, tactile ground surface indicators and/or audio devices must be provided in BUILDINGS and SITES required to be ACCESSIBLE to warn people with a vision impairment that they are approaching:

(a) a stairway, other than a FIRE-ISOLATED STAIRWAY

(b) a lift, escalator, moving walk or AUTOMATED ramp

(c) a ramp other than a FIRE-ISOLATED RAMP, step ramp, kerb ramp or swimming pool ramp

(d) an overhead obstruction less than 2 m above floor level, other than a doorway

(e) a kerb, kerb-ramp or a pedestrian crossing

and must comply with Specification D3.6 Braille and Tactile Signs in the Building Code of Australia, Volume 1

D1.B Outdoor Accessibility

.1 Parking Lots for REQUIRED ACCESSIBLE BUILDINGS must be constructed according to the provisions in:

(a) Disability Access Guideline, 2008, published by PUMA of the Government of Samoa

(b) Parking Policy and Standards, July, 2006 by PUMA of the Government of Samoa

(c) any subsequent amendments or similar documents published and approved by the Government of Samoa,

and:

(d) be provided at least 1 per SITE where more than 5 parking spaces are provided (not including on-street parking)

(e) be adjoined to an ACCESSIBLE ROUTE to the BUILDING or activities on SITE, including an even-surface transition from the parking space to an ACCESSIBLE walkway

(f) be demarcated by appropriate painting on the surface and appropriate signage

.2 Drop-off areas for REQUIRED ACCESSIBLE BUILDINGS must:

(a) be located within 30 m of BUILDING entries and bus stops, and other ACCESSIBLE SITE amenities, and sited as close as possible to the BUILDING entrance

(b) be a minimum of 3.2 m wide

(c) provide a smooth, level transition from the roadway to the walkway connecting to the BUILDING entry

(d) be clearly indicated through:
- (i) signage that restricts the use to drop-off for a PERSON WITH A DISABILITY and/or the elderly
- (ii) pavement markings and/or textures
- (iii) smooth level, non-slip pavement such as textured concrete

.3 Walkways for outdoor ACCESSIBLE ROUTES must:

(a) extend between the point of arrival (street, bus stop, parking lot, or other) and the BUILDING ENTRY

(b) be a minimum of 1.5 m wide with no obstructions disruptive to a PERSON WITH A DISABILITY

(c) be constructed of a paved, SLIP-RESISTANT surface or the like

(d) have a safe cross fall and safe slope in the direction of travel

(e) contain tactile strips (raised bumps, rough texture, painted surface, or the like) where the ACCESSIBLE ROUTE meets a change in level or at pedestrian crossings

(f) have a ramp for slopes that exceed 1:20 in accordance with Section D1

(g) place STORMWATER MANAGEMENT facilities, gratings and manholes outside of the ACCESSIBLE ROUTE or use protective coverings that do not impede movement of a PERSON WITH A DISABILITY

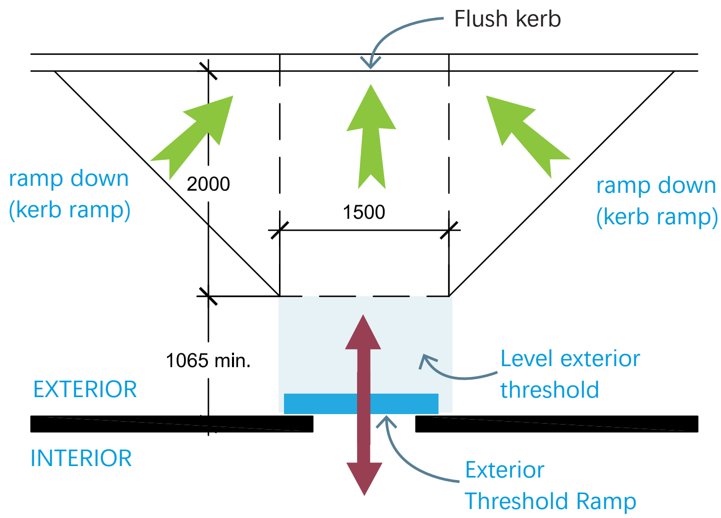
(h) where the ACCESSIBLE ROUTE is parallel to a kerb, a physical barrier between the ACCESSIBLE ROUTE and the kerb must be provided by:
  (i) installing a planting strip, bollards, low fence, decorative rocks, HANDRAIL, or other suitable landscape element, and/or
  (ii) installing a tactile guide such as coloured / textured pavement with a minimum width of 300 mm

(i) where a change in level between the ACCESSIBLE WALKWAY and the adjacent land exceeds 100 mm, a physical barrier must be provided as in Section D1.B.3 (h). Where the change in elevation exceeds 1,000 mm, a HANDRAIL must be provided (see Section D3 for requirements)

.4 Kerb ramps placed to provide a smooth transition between parking lot and walkways must be constructed as per the provisions in the Disability Access Guidelines, September, 2008, published by PUMA and any subsequent amendments or similar documents.

.5 Thresholds of external doors in REQUIRED ACCESSIBLE BUILDINGS must not incorporate a step or ramp within 1065 mm of the door (ie, must provide a smooth transition from the interior to the exterior), as illustrated in D1.B.5:

Figure D1.B.5: Exterior Threshold Setback from Access Ramp for a Required Accessible Building



.6 Thresholds must be level for REQUIRED ACCESSIBLE BUILDINGS or have a threshold ramp that complies with AS 1428.1 and have:

(a) maximum height of 35 mm

(b) length not more than 280 mm

(c) maximum gradient of 1:8 (vertical: horizontal)

(d) smooth transition with no kerb or edging

(e) SLIP-RESISTANT surface

.7 ACCESSIBLE pedestrian crossings extending across an internal road or within a parking lot to visually identify an ACCESSIBLE ROUTE must:

(a) be appropriately demarcated with a painted colour and/or texture that contrasts with the pavement according to the standards of the Land Transport Authority

(b) be constructed of smooth level, non-slip pavement

(c) include an even-surface transition from the pedestrian crossing to adjacent walkways, traffic islands or gathering areas

(d) have traffic control signals with appropriately-located push buttons, audible and visual signals, and time intervals where traffic conditions warrant

.8 Exterior ramps and landings must comply with provisions in Section D3.F below as well as the Disability Access Guidelines published by PUMA, as amended.

.9 Mailboxes intended for use by a PERSON WITH A DISABILITY must be located such that openings for retrieving mail are between 850 mm to 1,000 m above the finished grade.

D1.C Indoor Accessibility

.1 The main entrance for REQUIRED ACCESSIBLE BUILDINGS must have:

(a) at least one single, double or rotating door that is ACCESSIBLE through automation and is directly connected to an ACCESSIBLE ROUTE for BUILDING GROUP 1-3 (except **Storage** and **Heritage Buildings**) and BUILDING GROUP 4 (**Office / Commercial** only)

(b) appropriate signage indicating an ACCESSIBLE entrance

(c) level, SLIP-RESISTANT, even surface leading up to the door and extending into the lobby

(d) turnstiles or trolley traps, if used, must allow unrestricted access to a PERSON WITH A DISABILITY

.2 ACCESSIBLE EXITS and interior doorways required to be ACCESSIBLE must comply with the provisions in the Disability Access Guideline, 2008, published by PUMA and any subsequent amendments or similar documents published and approved by the Government of Samoa regarding doorway width, signage, tactile surface, threshold, and placement.

.3 Electronic access (swipe cards, key pads, door activating buttons) must:

(a) be installed between 900 mm and 1,200 mm above the FINISHED FLOOR

(b) be installed no less than 500 mm from a BUILDING corner and adjacent to the door under control

(c) have sufficient time-delay for the door to be opened before the locking system reactivates

.4 Lobbies must:

(a) be sufficient in GROSS FLOOR AREA to accommodate intended uses while allowing sufficient width for people in wheelchairs to have safe passage without obstruction

(b) have public uses such as mailboxes, public telephones, water fountains and the like, have controls 850 mm to 1.1 m high

(c) provide seating for a PERSON WITH A DISABILITY and space for wheelchairs to congregate appropriate to the use of the BUILDING

.5 ACCESSIBLE ROUTES in the BUILDING interior (in addition to provisions for ACCESSIBLE EXITS in Section D2 and D3 above) must:

(a) be free from dangerous obstructions and from any projections likely to cause an obstruction

(b) have adequate SLIP-RESISTANT walking surfaces under all conditions of normal use

(c) be of sufficient size to allow safe passage (minimum 1.5 m width)

(d) be constructed in accordance with Section C Fire Protection regarding appropriate:
- (i) FIRE HAZARD properties for BUILDING ELEMENTS, MATERIALS, LININGS, ASSEMBLIES
- (ii) OPENINGS for movement of people, air circulation, access and SITE SERVICING
- (iii) FIRE-ISOLATED PASSAGEWAYS and EXITS
- (iv) SMOKE CONTROL MANAGEMENT
- (v) FIRE SAFETY SYSTEM
- (vi) stability and levels of FIRE-RESISTANCE
- (vii) measures to assist EMERGENCY RESPONDERS

.6 Stairs and ramps in ACCESSIBLE ROUTES must comply with Section D3 Egress and Movement.

.7 Public TOILETS and SANITARY COMPARTMENTS in REQUIRED ACCESSIBLE BUILDINGS must:

(a) have at least one ACCESSIBLE TOILET, sink and associated sanitation accessories (wash basins, soap dispensers, hand-dryers, toilet paper holder, trash receptacles, mirror, etc.) wherever SANITATION COMPARTMENTS are provided

(b) have sufficient manoeuvring space so that people in wheelchairs can use all fixtures provided (TOILET, wash basin, mirror, shower, change rooms, clothes washing) and all SANITARY FIXTURES

(c) have a minimum area of 1.5 m by 1.9 m for a single-user sanitary station with TOILET, sink and SANITARY FIXTURES

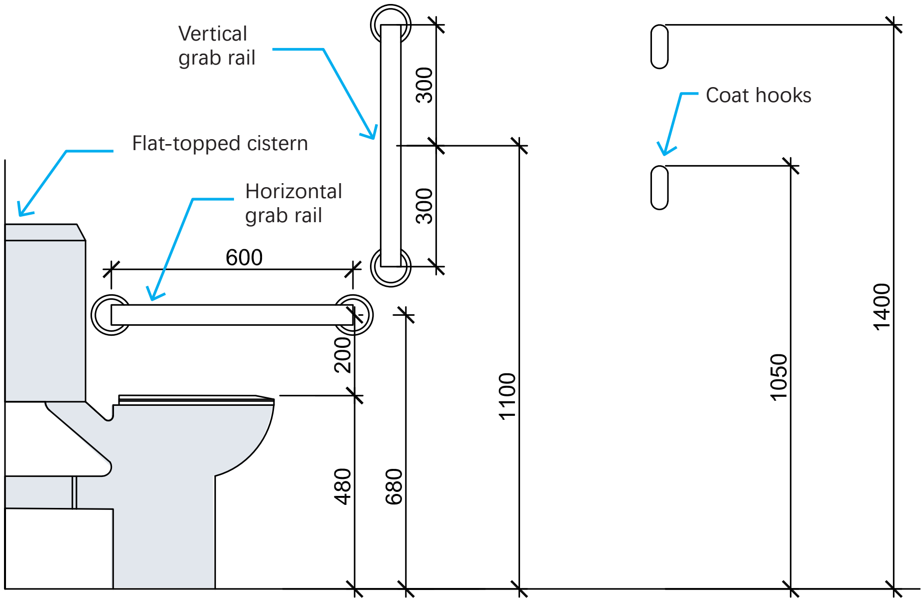
(d) have doors, TOILET pans and basins with appropriate dimensions, hardware and design details as per NZS 4121 Design for Access and Mobility and the Disability Access Guideline, 2008, published by PUMA, or other documents published and approved by the Government of Samoa

(e) have ACCESSIBLE urinals, where other urinals are provided, constructed without a step and with a horizontal grab rail that complies with Appendix F of NZS 4121

(f) position and locate fixed grab rails, toilet paper holders, soap dispensers, sanitary towel supply, hand-dryers, etc, so that they are 900 mm to 1400 mm above the FINISHED FLOOR and do not encroach into wheelchair manoeuvring space as illustrated in Figure D1.C.7

(g) have showers, if provided, that comply with NZS 4121 and the Disability Access Guideline, 2008, published by PUMA and any subsequent amendments or similar documents published and approved by the Government of Samoa

Figure D1.C.7: Accessible Features and Layout in a Sanitary Compartment



Example of appropriate placement for ACCESSIBLE features in a SANITARY COMPARTMENT

ACCEPTABLE SOLUTIONS

AS 3745: 2010 Planning For Emergencies In Facilities
AS 4299: 1995 Adaptable Housing
AS 2890: 2009 Parking Facilities

AS/NZS 1428.4.1: 2009 Design for Accessibility and Mobility - Tactile Ground Surface Indicators
AS/NZS 1730: 1996 Washbasins
AS/NZS 2890: 2009 Parking Facilities
Part 6: Off-street Parking for People with Disabilities
AS/NZS 3856: 1998 Hoists and Ramps for People with Disabilities - Vehicle-mounted
AS/NZS 4586: 2004 Slip Resistance Classification of New Pedestrian Surface Material

NZS 4121: 2001 Design for Access and Mobility - Buildings and Associated Facilities

NZMP 6004: 1999 Safer Electrical Installations in Homes for Children, the Elderly, and People with Disabilities

Accessibility Design Guideline: Universal Design Principles for Australia's Aid Program

Disability Access Guideline, 2008, published by PUMA of the Government of Samoa

Parking Policy and Standards, July, 2006, published by PUMA of the Government of Samoa

Royal New Zealand Foundation of the Blind- Accessible Signage Guidelines: 2010

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Construction Drawings must show details of outdoor and indoor ACCESSIBLE ROUTES including location, details and protection from fire
- Details of signage (wording, images, layout, location, size, colour) must be provided as well as details of all ACCESSIBLE communication devices

D2 Automated Access

REQUIRED PERFORMANCE

.1 AUTOMATED ACCESS (lifts, escalators, moving walkways, AUTOMATED ramps, AUTOMATIC-controlled doors, inclined platform lifts) for egress into, within and out of a BUILDING, FACILITY OR SITE must provide for the safe and easy movement of people, maintenance personnel, and deliveries.

.2 AUTOMATED ACCESS must be constructed to avoid the likelihood of people falling, tripping, becoming caught, being struck by moving parts, sharp edges or projections, under both normal and reasonably foreseeable abnormal operations, and be capable of being isolated for inspection, testing and maintenance.

.3 AUTOMATED ACCESS must have:

(a) adequate control over normal use, to ensure people's safety throughout any operation involving starting, stopping or changing the direction of travel

(b) notification of position, where people are fully enclosed and it serves more than two levels

(c) adequate lighting and ventilation for both normal and emergency use

(d) informative and warning signs regarding the use of any AUTOMATED access device during normal operations and during an emergency

(e) a means of releasing people safely, calling for help (in the case of a lift), and overriding normal operating procedures to take exclusive control in an emergency

(f) adequate safeguards to protect people from HAZARDOUS SUBSTANCES during normal operation and in an emergency situation

.4 Where a lift is intended to be used (in addition to stairways / ramps) to assist occupants to evacuate a building safely, the type, number, location and FIRE RESISTANCE must be appropriate to:

(a) the travel distance to the lift

(b) the number, mobility and other characteristics of occupants

(c) the function or use of the BUILDING, and the number of STOREYS connected by the lift

(d) the waiting time, travel time and capacity of the lift

(e) the FIRE SAFETY SYSTEM installed in the BUILDING and emergency procedures

(f) the number and location of FIRE COMPARTMENTS and EVACUATION ROUTES

.5 The location, number and operational requirements of ACCESSIBLE AUTOMATED ACCESS equipment (lifts, escalators, moving walkways, AUTOMATED ramps, AUTOMATIC-controlled doors, inclined platform lifts) in REQUIRED ACCESSIBLE BUILDINGS will be approved by the Government of Samoa based on:

(a) building scale, function and occupancy

(b) intended use of the lift

(c) EVACUATION ROUTE

D2.A Lifts

.1 Lifts must be provided in:

(a) **Health-Care** and **Aged-Care Buildings** greater than one STOREY in HEIGHT, be ACCESSIBLE and of sufficient size to accommodate a stretcher (see Figure D2.A.3)

(b) REQUIRED ACCESSIBLE BUILDINGS greater than one STOREY in HEIGHT (see Section D1.5 above for BUILDING FUNCTIONS) where other ACCESSIBLE access is not provided

(c) TALL BUILDINGS greater than 4 STOREYS in HEIGHT

|

.2 All lifts are required to:

(a) be ACCESSIBLE, unless their function is primarily for movement of goods

(b) contain mobility aids and design features shown in Table D2.A.2 below

(c) be of a minimum size for accessibility and/or emergencies as illustrated in Figure D2.A.3 below

(d) be connected to a standby power supply system where installed

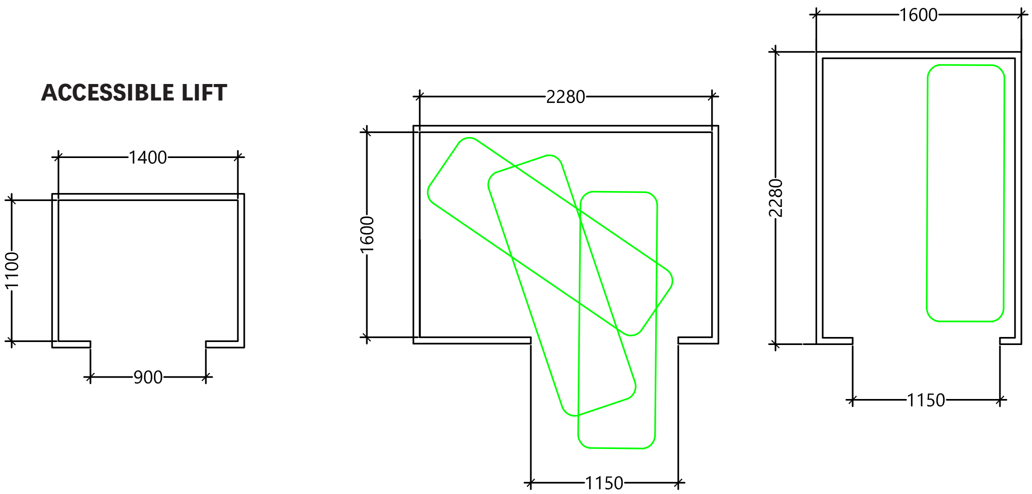
(e) have an emergency call button connected to SFESA (Samoa Fire and Emergency Services Authority)

(f) have emergency lighting that:
- (i) comes on automatically upon failure of the normal lighting supply
- (ii) provides at least 20 lux of lighting for 2 hours when activated

Table D2.A.2 Accessible Design Features in Lifts

Accessible Design Feature	Application
HANDRAIL (must comply with AS 1735.12)	All lifts except: a stairway platform lift, a low-rise platform lift, and a lift used primarily for transport of goods
Minimum lift floor of 1,400 mm wide by 1,600 mm deep	All lifts that travel > 12 m
Minimum lift floor of 1,100 mm wide by 1,400 mm deep	All lifts that travel < 12 m except stairway platform lift
Minimum lift floor of 1,800 mm by 2,250 mm	ACCESSIBLE EMERGENCY LIFT
Minimum clear door opening complying with AS 1735.12	All lifts except a stairway platform lift
Passenger protection system complying with AS 1735.12	All lifts with a power operated door
Lift landing doors at the upper landing	All lifts except a stairway platform lift
Lift car and landing control buttons complying with 1735.12	All lifts except a stairway platform lift and a low-rise platform lift
Lighting in accordance with AS 1735.	All enclosed lift cars
(a) automatic audible information within the lift car to identify level each time the car stops (b) audible and visual indication at each lift landing to indicate the arrival of a lift car (c) audible information and indication in (a) and (b) provided in the range of 20-80 dB(A)(at a maximum frequency of 1,500 Hz	All lifts serving more than 2 levels
Emergency hands-free communication, including a button that alerts the fire department (SFESA) of a problem and indicator light	All lifts except a stairway platform lift
Mirror installed on lift interior to provide visibility of floor identity indicator	All lifts

Figure D2.A.3: Minimum Dimensions for Lift Types



EMERGENCY ACCESSIBLE LIFTS
must accommodate a stretcher

.3 Notwithstanding Section D2.A.1 above, any BUILDING providing access to upper STOREYS by way of a lift must have at least one ACCESSIBLE EMERGENCY LIFT with appropriate sizing to carry a stretcher (600 mm by 2,000 mm by 1,400 mm height with 125 mm rounded corners) per FIRE COMPARTMENT or STOREY, as illustrated in Figure D2.A.3.

.4 All lifts in a **Health-Care Building** (except lifts used exclusively for maintenance and SITE SERVICING of the BUILDING) must have the dimensions shown in Table D2.A.4 below:

Table D2.A.4: Minimum Lift Size in Health-care Buildings

Measurement	Minimum Size
depth of car	2,280 mm
width of car	1,600 mm
floor to ceiling height	2,300 mm
door height	2,100 mm
door width	1,300 mm

.5 For fire protection, all lifts must:

(a) be located in a FIRE-ISOLATED SHAFT with a minimum FRL of 120/120/120 and comply with Table CD.5 and Table CD.6 in the NBC regarding FRL for lift SHAFTS and BUILDING MATERIALS

(b) be separated from a FIRE-ISOLATED STAIRWAY or other parts of the BUILDING by:
- (i) a FIRE DOOR with a FIRE RESISTANCE of –/60/– that complies with AS/NZS 1735.11 and will remain closed except when in use, and/or
- (ii) a SMOKE LOBBY (see Section D2.A.5 in the NBC)

(c) have a COMPLIANT SPRINKLER SYSTEM at the top and bottom of the SHAFT in compliance with AS 2118.1-1999

(d) have service and SITE SERVICING openings in the FIRE-ISOLATED SHAFT comply with Section C6

(e) have warning signs that comply with approved standards regarding size, wording, colours, letter type (incised, inlaid or embossed) displayed near every call button for a lift or group of lifts throughout a BUILDING, except for small lifts such as a dumb-waiter or the for the transport of goods only

.6 Lift type, use and capacity permitted in a REQUIRED ACCESSIBLE BUILDING are listed in Table D2.A.6:

Table D2.A.6: Permitted Lift Types with Limitation on Use

Lift Type	Limitation on Use
Electric passenger lift	No limitation
Electro-hydraulic passenger lift	No limitation
Stairway platform lift	Must not: (a) be used to serve a space in a BUILDING accommodating more than 100 persons b) be used in a high traffic public use area such as a theatre, cinema, auditorium, transport interchange, shopping centre, or the like c) be used where it is possible to install another type of passenger lift (d) connect more than 2 STOREYS, or (e) where more than 1 stairway lift is installed, serve more than 2 consecutive STOREYS, or (f) when in the folded position, encroach on the minimum width of a stairway
Inclined Lift	No limitation
Low-rise platform lift	Must not travel more than 1,000 mm
Low-rise, low-speed constant pressure lift	Must not: (a) for an enclosed type, travel more than 4 m,or (b) for an unenclosed type travel more than 2 m, or (c) be used in high traffic public use areas in BUILDINGS such as a theatre, cinema, auditorium, transport interchange, shopping centre, or the like
small size, low-speed AUTOMATIC lift	must not travel more than 12 m

.7 Access to lift pits for maintenance or emergencies must:

(a) where the pit depth is not more than 3 m, be through the lowest landing doors, or

(b) where the pit depth is more than 3 m, be provided through an access doorway complying with the following:

(i) the doorway must be level with the pit floor and not be less than 600 mm wide by 1980 mm high clear opening, which may be reduced to 1500 mm where it is necessary to comply with (ii)
(ii) no part of the lift car or platform must encroach on the pit doorway entrance when the car is on a fully compressed buffer
(iii) access to the doorway must be by a stairway complying with AS 1657
(iv) doors fitted to the doorway must be:

(A) of the horizontal sliding or outwards opening hinged type

(B) SELF-CLOSING and self-locking from the outside

(C) marked on the landing side with the letters not less than 35 mm high:
"DANGER LIFTWELL - ENTRY OF UNAUTHORISED PERSONS PROHIBITED - KEEP CLEAR AT ALL TIMES"

.8 An electric passenger lift installation and an electro-hydraulic passenger lift installation must comply with Specification E3.1 Lift Installations in the Building Code of Australia, Volume 1.

.9 Lift cars exposed to solar radiation directly or indirectly by re-radiation must have:

(a) mechanical ventilation at a rate of one air change per minute, or

(b) mechanical cooling

(c) a 2 hour alternative power source for ventilation or mechanical cooling, provided in the event of normal power loss.

.10 While a lift in a lift SHAFT is operating, the cooling of the lift SHAFT must:

(a) ensure that the dry bulb air temperature in the lift SHAFT does not exceed 40°C

(b) if the cooling is by a ventilation system, be provided with an air change rate determined using a temperature rise of no more than 5 K

.11 Where a lift is installed in a single enclosed lift SHAFT having a distance between normal landing entrances greater than 12.2 m, emergency access doors must be provided and constructed as follows:

(a) the clear opening size of emergency doors must be not less than 600 mm wide x 980 mm high

(b) hinged doors must not open towards the interior of the lift SHAFT

(c) doors must be SELF-CLOSING and self-locking

(d) doors must be marked on the landing side with the letters not less than 35 mm high:
“DANGER LIFTWELL ACCESS” “KEEP FURNITURE AND FIXTURES CLEAR”

(e) doors from the landing side must only be openable by a tool

(f) each emergency door must be provided with a positive breaking electrical contact, wired into the control circuit to prevent movement of the lift until the emergency door is both closed and locked

(g) in single enclosed lift SHAFTS where ropes are installed

(h) emergency egress from the lift car must be provided in the form of an interlocked door with clear opening dimensions not less than 600 mm x 600 mm, accessible from the lift car entrance or the lift car roof (where the door is located in the wall of the lift SHAFT)

.12 A lift call panel, indicator panel or other panel in the wall of a FIRE-ISOLATED lift SHAFT must be backed by construction having an FRL of not less than –/60/60 if it exceeds 35,000 mm^2 in area.

D2.B Escalators, Moving Walkways and Automated Ramps

.1 AUTOMATED ACCESS devices (escalators, moving walkways and AUTOMATED ramps) must have:

(a) a tactile ground surface a minimum of 600 mm in length installed at all entry / exit points located within 300 mm of the HANDRAILS of the AUTOMATED ACCESS device

(b) colour markings associated with the tactile ground surface that differentiates it from the surrounding floor material

(c) safety control and shut-off buttons and levers that can be easily accessed and are visually ACCESSIBLE through signage and/or an audio warning system

(d) HANDRAILS that extend past the moving portion of the device for a minimum of 0.3 m

(e) a safe operational speed compliant with the intended purpose, number of occupants and load

(f) good illumination

(g) protection from weather if located outdoors

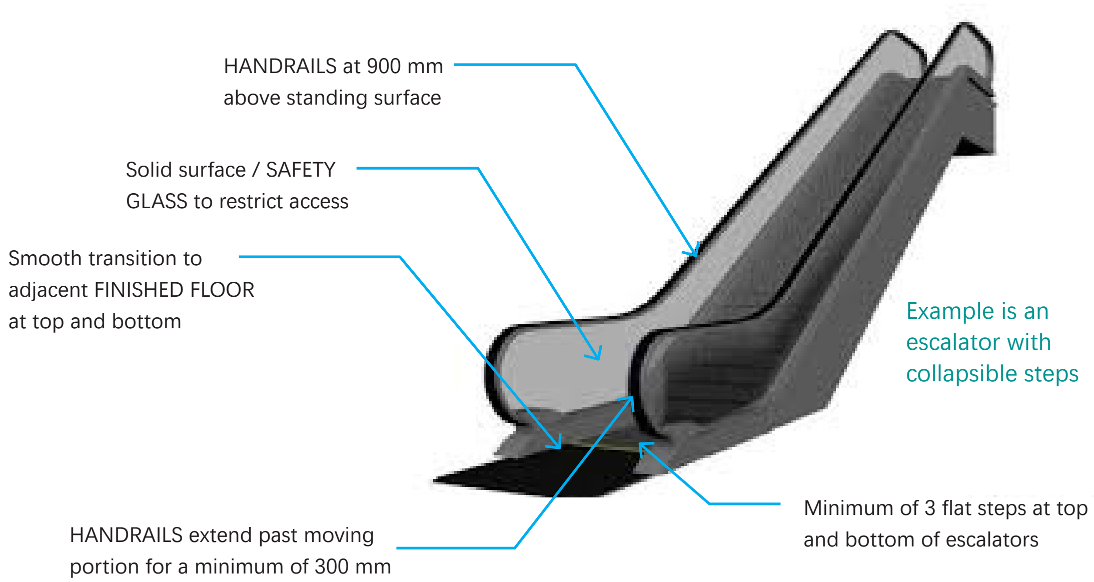
(h) moving HANDRAILS at a height of 900 mm and on both sides

(i) a minimum of 3 flat steps at the beginning and the end

(j) signs/indicators at EMERGENCY EXITS indicating no entrance

(k) emergency hands-free communication, including a button and indicator light that alert the fire department / FIRE ACCESS CONTROL CENTRE of a problem

Figure D2.B.1: Safety Measures for Automated Access Devices



ACCEPTABLE SOLUTIONS

AS 1735.12 to 1735.17: 1995 Lifts, Escalators and Moving Walks – Facilities for Persons with Disabilities
AS 1735.2: 2011 Passenger and Goods Lifts – Electric
AS 1735.3: 2002 Passenger and Good Lifts - Electro-Hydraulic
AS 1735.4: 1986 Service Lifts - Power Operated.
AS 1735.5: 2015 Escalators and Moving Walks
AS1735.7: 1998 Stairway Lift:
AS 1735.8: 1986 Inclined Lifts
AS 1735.9: 1994 Special Purpose Industrial Lifts
AS 1735.10: 1998 Lifts, Escalators and Moving Walks - Tests
AS 1735.11: 1986 Fire-Rated Landing Doors
AS 4178: 1994 Electromagnetic Door Holders

AS/NZS 1735.1: 2003 / Amdt 1-2006 Lifts, Escalators and Moving Walks – General Requirements
AS/NZS 1735.18: 2002 Passenger Lifts for Private Residence – Automatically Controlled
AS/NZS 4455: 1997 Masonry Units and Segmental Pavers
AS/NZS 4456: 2003 Masonry Unit and Segmental Pavers - Methods of Test

BS EN81: 1998 Safety Rules for the Construction and Installation of Lifts

Building Code of Australia, Volume 1
    Specification D1.12 Non-Required Stairways, Ramps and Escalators
    Specification E3.1 Lift Installations

ISO 10535: 2006 Hoists

NZS 4239: 1993 Automatic Sliding Door Assemblies
NZS 4332: 1997 Non-Domestic Passenger and Goods Lifts
NZS 4334: 2012 Lifts for Low-rise, Low-speed and Low Use Applications

European Committee For Standardisation
    EN 81: 1998 Safety Rules for the Construction and Installation of Lifts
    EN 115: 2008 Safety of Escalators and Moving Walks

New Zealand Ministry of Transport - Power Lift Rules: 1989

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Construction drawings, specifications and/or product sheets for all AUTOMATED ACCESS devices

D3 Egress and Movement

REQUIRED PERFORMANCE

.1 Occupants and EMERGENCY RESPONDERS must be able to safely enter and exit a BUILDING, FACILITY and SITE or reach a PLACE OF SAFETY appropriate to the use, scale and occupancy.

.2 The construction, arrangement, size, number and type of EXITS, stairways, ramps and AUTOMATED ACCESS must be appropriate to:

(a) travel distance within the BUILDING and/or FACILITY, to other BUILDINGS on the SITE, and to the point or arrival and exit from the SITE

(b) HEIGHT of the BUILDING or FACILITY

(c) FIRE SAFETY SYSTEM

(d) location of the EXIT in relation to the ground level

(e) ability of EMERGENCY RESPONDERS to safely pass through with required equipment at the same time that occupants are exiting the BUILDING, FACILITY or SITE

.3 Means of egress must be clearly identified, visible, provided with adequate illumination, and be easy and safe to use by means of:

(a) non-slip surfaces for stairways, ramps , landings, corridors, lobbies, ATRIA, MEZZANINES

(b) safe gradients

(c) suitable HANDRAIL where deemed necessary

(d) protection from falling where there is a sudden change in vertical distance between floors, corridors, hallways, balconies, DECKS, walkways, verandas, roofs, landings, bridges, or the like, of 1,000 mm or greater

(e) doors, landings and thresholds without obstructions

(f) stairs appropriate to the nature, volume and frequency of use

.4 EXITS must protect for Samoa's climate by providing:

(a) overhead protection attached to the BUILDING to shelter people from rain and sun

(b) SITE design and BUILDING construction so that RUNOFF does not accumulate at the threshold of the EXIT through appropriate grading, ROOF DRAINAGE, STORMWATER MANAGEMENT, FLOOR DRAINS, FRENCH DRAINS, or a combination thereof

.5 PUBLIC CORRIDORS and hallways that connect to an EXIT must:

(a) be a minimum of 2.0 m in height

(b) be a minimum of 1.5 m in width (unless the occupancy demands a greater width, such as a **Stadium**, Assembly Building, or MEZZANINE accommodating more than 200 people)

DEEMED-TO-SATISFY PROVISIONS

D3.A Number, Location and Type of Exits

.1 For BUILDING GROUP 1-4, the following EXITS must be provided, where appropriate, as illustrated in the example in Figure D3.A.1:

(a) **ACCESSIBLE EXIT** a BUILDING EXIT constructed to allow safe passage for PERSONS WITH A DISABILITY

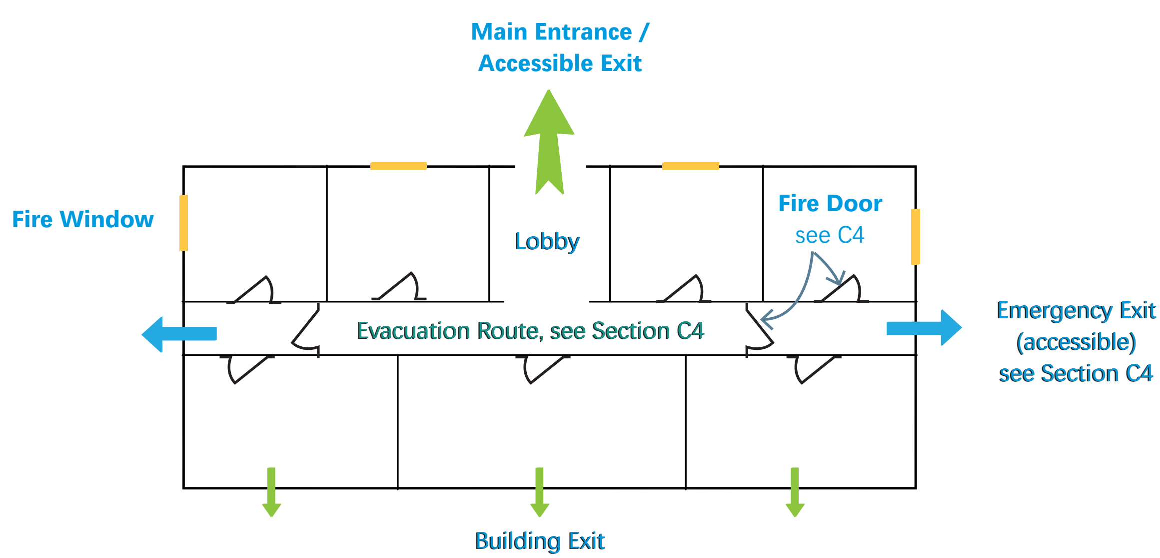
(b) **BUILDING EXIT** an opening providing access to and from a BUILDING, FACILITY

(c) **EMERGENCY EXIT** an AUTOMATIC door in an EXTERNAL WALL automated by the FIRE SAFETY SYSTEM, see Section C7

(d) **FIRE DOOR** an AUTOMATIC door with an approved FRL used within an EVACUATION ROUTE and to provide access to an EVACUATION ROUTE that is ACCESSIBLE - See Section C7

(e) **FIRE WINDOW** a window that opens to the outside of the structure that has an opening sufficient in size for EMERGENCY RESPONDERS to crawl through in the event of an emergency

Figure D3.A.1: Types of Exits and Doors in a Multiple Unit Building



.2 Every BUILDING and/or UNIT must have one ACCESSIBLE EXIT, and any, some or all of the following appropriate to the use, size, occupancy and presence of HAZARDOUS SUBSTANCES:

(a) at least one other EXIT listed in Section D3.A.1 above, or

(b) a COMPLIANT SPRINKLER SYSTEM

.3 EXITS required as alternative means of egress must be:

(a) distributed as uniformly as practicable within or around the STOREY served and result in a minimum of 2 unobstructed EXITS readily available from all points on the floor including lift lobby areas

(b) located so that alternative paths of travel do not converge or are less than 6.0m apart

.4 The distance between EXITS on the ground floor to a road or open space must be as indicated in Table D3.A.4:

Table D3.A.4 Maximum Travel Distance from Interior of Building to the Outdoors

Building Function	Travel Measurement	Maximum Distance	
		Fire-Isolated Construction	Non-Fire-Isolated Construction
Multiple Unit Residential	between door of a UNIT to an EXIT or to a point from which travel to 2 different EXITS is available	See Section C4 Evacuation Route of the NBC, and if no standards are provided in C4, use the standards to the right for non FIRE-ISOLATED CONSTRUCTION	6 m
	between door of a UNIT to a single EXIT on ground floor		20 m
	between any point not located in a UNIT to an EXIT or to a point from which travel to 2 different EXITS is available		20 m
	between door of a room or UNIT to a stairway or ramp, to a point of egress to a road or open space		30 m in Type C construction• 60m for all other BUILDINGS
	between two or more points of egress to a road or open space provided from a stairway or ramp		must provide separate egress to road or open space• be suitably smoke-separated at EXIT level
Multiple Unit Residential and **Health-Care Buildings**	between a stairway or ramp to a point of egress to a road or open space		15 m
	between two points of egress to a road or open space if travel to each of them is from opposite or near-opposite directions		30 m
All BUILDING FUNCTIONS except **Residential**, **Storage, Minor** or **Temporary Structure**	between any point on a floor to a stairway or ramp, to a point of egress to a road or open space		80 m
	between any point on a floor to an EXIT		20 m
	between any point on a floor to a point from which travel in different directions to 2 EXITS is possible		20 m
	from a stairway or ramp to a point of egress to a road or open space		20 m, and 30 m for an **Office** or **Retail Buildings**
	between two points of egress to a road or open space if travel to each of them is from opposite or near-opposite directions		40 m
Patient Care area in a **Health-Care Building**	between any point on a floor to a point from which travel to two different directions to 2 required EXITS		12 m, and no more than 30 m for the total length from UNIT to EXIT
Open Spectator Stands / **Stadiums**	between any point in the structure to an EXIT		60 m
Assembly Buildings	between the door to an EXIT through a corridor, hallway, lobby or ram, and the assembly room has a FRL of 60/60/60 with all doorways protected by a tight-fitting, SELF-CLOSING solid-core door > 35 mm thick		60 m - where the maximum distance of travel does not exceed 40 m within the assembly room or 20 m from the assembly room to the EXIT

.5 External stairways or ramps may be used on BUILDINGS less than 25 m height, and must:

(a) be NON-COMBUSTIBLE throughout

(b) be adjacent to an EXTERNAL WALL with a FRL of 60/60/60

(c) have no openings closer than 3m to the external stairway other than the FIRE DOOR serving the EXIT

(d) have a FIRE DOOR with a FRL of -/60/30 that complies with Section C4 D of the NBC and Specification C3.4 of the Building Code of Australia, Volume 1

(e) for openings located 3 m to 6 m from the FIRE DOOR, have either:

(i) the openings protected according to:
(A) Section C4.D Fire Doors, and Section C4.E Smoke Doors of the NBC, and Specification C3.4 of the Building Code of Australia, Volume 1 and/or
(B) use wall-wetting sprinklers on the inside of the BUILDING, or

(ii) have a wall, roof, floor, or other shielding element with a FRL of 60/60/60 that protects the external stairway from any openings located 3.0 - 6.0 m from the stairway

.6 Minimum requirements for the number of EXITS in BUILDINGS and FACILITIES are provided in Table D3.A.6:

Table D3.A.6: Minimum Requirements for Number of Exits for Building Groups and Building Functions

Building Group	Building Function	Required Exits in Accessible Buildings / Units
1	All	Number and location of ACCESSIBLE EXITS per STOREY, UNIT or FIRE COMPARTMENT appropriate to occupancy, use and FIRE SAFETY SYSTEM
2	**Health-Care** and **Aged-Care Buildings** with sleeping accommodations	All ACCESSIBLE UNITS must have one ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM At least one ACCESSIBLE EXIT for every FIRE COMPARTMENT on a STOREY as part of the EVACUATION ROUTE
	All other BUILDINGS	One ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM, or 2 ACCESSIBLE EXITS per ACCESSIBLE UNIT At least one ACCESSIBLE EXIT for every FIRE COMPARTMENT on a STOREY as part of the EVACUATION ROUTE, 2 or more ACCESSIBLE EXITS to a FIRE-ISOLATED STAIRWAY OR RAMP, or to an outdoor stairway, ramp or PLACE OF SAFETY
3	**Multiple Unit Buildings** (side-by-side, single STOREY)	One ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM or 2 ACCESSIBLE EXITS per ACCESSIBLE UNIT
	All other BUILDINGS (single tenant) and **Multiple Unit Buildings** with 2 or more STOREYS	One ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM or 2 ACCESSIBLE EXITS per ACCESSIBLE UNIT; 2 or more ACCESSIBLE EXITS to a FIRE-ISOLATED STAIRWAY OR RAMP per upper STOREY based on occupancy, use and FIRE SAFETY SYSTEM, where BUILDING has a PUBLIC CORRIDOR and EVACUATION ROUTE
4	**Multiple Unit Buildings** (side-by-side, single STOREY)	One ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM or 2 ACCESSIBLE EXITS per ACCESSIBLE UNIT
	BUILDINGS (single tenant) and **Multiple Unit Buildings** with 2 or more STOREYS	One ACCESSIBLE EXIT with a COMPLIANT SPRINKLER SYSTEM or 2 ACCESSIBLE EXITS per STOREY 2 or more ACCESSIBLE EXITS to an EVACUATION ROUTE per STOREY based on occupancy, use and FIRE SAFETY SYSTEM, where applicable
5	**Regulated Fales** / **Single Unit Residential**	One ACCESSIBLE EXIT per UNIT, and at least one other EXIT

.7 UNITS in Multiple Unit Buildings that are not required to be ACCESSIBLE must have the following number of EXITS:

(a) one BUILDING EXIT if there is an internal COMPLIANT SPRINKLER SYSTEM, or

b) one BUILDING EXIT with a FIRE WINDOW on the ground floor near the rear of the UNIT, or

(c) two BUILDING EXITS

.8 When calculating the total number of required EXITS, HORIZONTAL EXITS must:

(a) not be counted as a required EXIT between UNITS in an early childhood centre or **School**

(b) not comprise more than half of the required EXITS from any part of a STOREY divided by a FIRE WALL

D3.B Emergency Exits

.1 EMERGENCY EXITS in BUILDINGS, FACILITIES or other structures must:

(a) not impede safe movement of people in any direction

(b) have doors that open in the direction of exit, or have a transparent upper panel if constructed to open in both directions

(c) have SELF-CLOSING doors connected to required stairways and lobbies

(d) meet any other applicable standards in the Building Code of Australia, Volume 1

(e) have suitable signage identifying it as an EMERGENCY EXIT appropriate for people of all abilities

.2 EMERGENCY EXITS must comply with all provisions in Section D Access.

.3 EMERGENCY EXITS with AUTOMATIC FIRE DOORS must be installed:

(a) if SMOKE DETECTORS are unsuitable for the BUILDING, FACILITY or SITE

(b) in accordance with Section C4.D Fire Doors of the NBC, and the relevant provisions of AS 1670.1

(c) not more than 1.5 m horizontal distance from the approach side of the doorway

.4 The operation of AUTOMATIC FIRE DOORS must be activated by any other part of a FIRE SAFETY SYSTEM, including a COMPLIANT SPRINKLER SYSTEM.

D3.C Doors

SEE SECTION C4.D FOR FIRE DOORS AND SECTION C4.E FOR SMOKE DOORS

.1 Dimensions of a doorway for the passage of people must be:

(a) minimum of 1,980 mm in height

(b) for Residential Buildings
- (i) minimum of 800 mm clear space for ACCESSIBLE doors
- (ii) minimum of 715 mm clear space for non-ACCESSIBLE doors

(c) for non-residential BUILDINGS
- (i) minimum of 915 mm clear space for ACCESSIBLE doors
- (ii) minimum of 800 mm for non-ACCESSIBLE doors, unless the use and function of the adjacent uses are such that a smaller door is warranted

.2 Doors in an **Aged-Care Building** must not be fitted with:

(a) a sliding FIRE DOOR or SMOKE DOOR

(b) a revolving door

(c) a roller shutter door

(d) a tilt-up door

(e) a hollow wood door

(f) a solid core door less than 35 mm thick

(g) a door without a SELF-CLOSING device, a delayed closing device or an AUTOMATIC closing device unless the use of the doorway is such that a SELF-CLOSING door is not appropriate

.3 Doors in a patient care area of a **Health-Care Building** must not be fitted with:

(a) a sliding door, unless:
- (i) it leads directly to a road, open space or PLACE OF SAFETY
- (ii) the door is able to be opened manually under a force of not more than 110 N

(b) a revolving door

(c) a roller shutter or tilt-up door, unless:
- (i) it serves a **Retail**, **Carpark** or **Industrial** use in the BUILDING with a maximum GROSS FLOOR AREA of 200 m^2
- (ii) the doorway is the only required EXIT from the BUILDING or part
- (iii) it is held in the open position while the BUILDING or part is lawfully occupied

(d) a power-operated door unless it is able to be opened manually under a force of not more than 110 N if there is a malfunction or failure of the power source

.4 Dimensions of doorways for the passage of people, stretches and wheelchairs in **Health-Care** and **Aged-Care Buildings** must have an unobstructed clear space of:

(a) 1,200 mm if the adjacent corridor on both sides is less than 2.2 m in width

(b) 1,070 mm if the adjacent corridors on both sides are 2.2 m in width or greater

(c) 1,250 mm in a patient care area if it is a HORIZONTAL EXIT

(d) 1,070 mm where it opens from a PUBLIC CORRIDOR to a **Single Occupancy Unit**, or a single- or shared sleeping accommodation UNIT

(e) 870 mm in other resident use areas

(f) 800 mm in non-resident use areas

(g) 750 mm in any other area except where it opens to a SANITARY COMPARTMENT or BATHROOM

.5 All doors in a **Multiple Unit Residential Building** must be protected by:

(a) in a BUILDING of Type A construction — a SELF-CLOSING –/60/30 FIRE DOOR (see Section C4)

(b) in a BUILDING of Type B or C construction — a SELF-CLOSING, tight fitting, solid core door > 35 mm thick

.6 AUTOMATIC closing doors must be:

(a) installed in accordance with the relevant provisions of AS/NZS 1670.1

(b) located not more than 1.5 m horizontal distance from the approach side of the doorway

(c) comply with Section C4.D of the NBC if it is a FIRE DOOR, and Section C4.E if it is a SMOKE DOOR

(d) be activated by either:
- (i) a component of the FIRE SAFETY SYSTEM such as a SMOKE DETECTOR or COMPLIANT SPRINKLER SYSTEM, and/or
- (ii) a spring-latch, or the like, that will automatically cause the door to be closed after it is opened

.7 Swinging Doors must:

(a) not encroach by more than 500 mm into the landing of a stairway, ramp, door, and/or entrance to a lift or other AUTOMATED ACCESS features

(b) not encroach by more than 100 mm on the required width of an EXIT when fully open

(c) be FIRE-RESISTANT if located within a FIRE-ISOLATED PASSAGEWAY, STAIRWAY, RAMP or EXIT

(d) swing in the direction of egress unless:
- (i) it serves a BUILDING or part with a FLOOR AREA not more than 200 m^2, is the only EXIT from the BUILDING, and is fitted with a device for holding it in the open position
- (ii) it serves a SANITARY COMPARTMENT or airlock (in which case it may swing in either direction)

(e) must not otherwise impede the use of the doorway in both directions

D3.D Protection from Falling

.1 Where there is a sudden change in elevation of 1,000 mm or greater between or along a floor, corridor, hallway, balcony, DECKS, verandah, roof, landing, MEZZANINE, walkway, bridge or the like, fall protection needs to be provided.

.2 Fall protection is provided by any one of the following:

(a) a HANDRAIL used on stairs, ramps, landings and balconies along with BALUSTERS, glass panels or other barrier

(b) a guardrail used along roads or walkways along with BALUSTERS, glass panels or other barrier

(c) a wall, a fence or other continuous, immovable object that meet all other provisions in the NBC

(d) rocks or other landscape objects of sufficient height that are continuous and cannot be easily moved or mounted

(e) a wire or CABLE barrier

and must comply with Tables D3.D.3 and D3.D.4 below

Table D3.D.3: Minimum Height of Fall Protection Barriers

	Minimum Height Requirement	Spacing Between Openings in Fall Protection Barriers
Change in level is 1.0 - 1.8 m in height	1,000 mm height for fall protection barrier	125 mm sphere cannot pass through
Change in level is >1.8 m	1,100 mm height for fall protection barrier	125 mm sphere cannot pass through
HANDRAIL height for stairs and ramps	900-965 mm height from FFL	125 mm sphere cannot pass through
Roof top that has PLUMBING and SITE SERVICING equipment	1,200 mm height for fall protection barrier	125 mm sphere cannot pass through
All BUILDINGS	Any horizontal or near horizontal part of the fall protection barrier located between 150 mm and 760 mm above the FINISHED FLOOR must not facilitate climbing	

.3 Fall protection barriers for open-sided walking surfaces must achieve the minimum height and spacing between openings listed in Table D3.D.3:

.4 Openings in fall protection barriers must comply with the size and location requirements in Table D3.D.4 below to protect young children from falling from stairways, ramp, landings and other raised platforms:

Table D3.D.4: Size and Location Requirements for Openings in Fall Protection Barriers

Access Feature	Size and Location Requirements for Openings in Fall Protection Barriers
Stairway in **Storage Buildings** and **Industrial Buildings**	• maximum 150 mm dia. opening between stair treads • maximum 150 mm dia. opening between the nosing and the rail • maximum 150 mm dia. opening between the lowest horizontal rail fall protection barrier and the floor of the landing, balcony, and the like
Stairway in all other non-residential BUILDINGS	• maximum 125 mm dia. opening between stair treads • maximum 125 mm dia. opening between the nosing and the rail • maximum 125 mm dia. opening between the lowest horizontal rail fall protection barrier and the floor of the landing, balcony, and the like
Stairways in **Residential** buildings	• maximum 125 mm dia. opening between stair treads • maximum 125 mm dia. opening between the nosing and the rail • maximum 100 mm dia. opening between the lowest horizontal rail fall protection barrier and the floor of the landing, balcony, and the like
Ramps where there is a difference in height of 1.0 m or more to the ground below	• maximum 100 mm dia. opening between stair treads • maximum 100 mm dia. opening between the nosing and the rail • maximum 100 mm dia. opening between the lowest horizontal rail fall protection barrier and the floor of the landing, balcony, and the like

.5 Fall protection barriers are not required:

(a) on the loading side of loading docks or piers

(b) on the audience side or on raised stages such as runways, ramps and side stages for entertainment or presentations, except for an orchestra pit

(d) at vertical openings in the performance area of stages and platforms

(e) along vehicle service pits not accessible to the public

(f) in assembly seating unless there is a change in level of 300 mm or greater that does not involve a stairway or ramp

D3.E Stairways

.1 Internal and external stairs must be SLIP-RESISTANT and constructed of one of the following materials:

(a) NON-COMBUSTIBLE material and fabricated so that it will not cause structural damage to, or impair the FIRE-RESISTANCE of the SHAFT

(b) reinforced or pre-stressed concrete

(c) steel greater than 6 mm thick throughout

(d) timber that:
- (i) has a finished thickness of greater than 44 mm
- (ii) has an average density of greater than 800 kg/m^3 at a moisture content of 12%
- (iii) not been joined by means of glue unless it has been laminated and glued with resorcinol formaldehyde or resorcinol phenol formaldehyde glue

.2 All stairways must have:

(a) from 2 to 18 risers per flight

(b) uniform going size, tread size, and spacing between goings per flight, with a 9.5 mm tolerance

(c) size of goings (G), risers (R) and the quantity of both (2R + G) as indicated in Figure D3.E.2, with a minimum height of 100 mm between treads

(d) maximum height of 125 mm between treads for open-style stairs without risers

(e) nosings (20 mm to 35 mm) or angled steps (maximum overhang of 30 mm) required for interior stairs

(f) fall protection barriers (Section D3.D above) where the change in grade between the stair tread or landing and the adjacent FINISHED FLOOR or finished grade creates a danger of falling

(g) treads which have a non-slip surface:
- (i) a surface with a slip-resistance classification not less than that listed in Table 3.9.1.1 of the Building Code of Australia, Volume 2, when tested in accordance with AS 4586, or
- (ii) a nosing strip with a slip-resistance classification not less than that listed in Table 3.9.1.1 of the Building Code of Australia, Volume 2 when tested in accordance with AS 4586

(h) width appropriate to the BUILDING function, use and occupancy, and that will permit safe access by EMERGENCY RESPONDERS during a DISASTER or emergency

(j) positive drainage so that water does not accumulate on treads or landings for outdoor stairways

(k) headroom of a minimum of 2.0 m measured from the tread or landing floor to the covering above

(l) if required to be FIRE RESISTANT, be in conformity with Section C.3, 4, 5 and 6

(m) for non-residential BUILDINGS, FACILITIES and SITES, the front edge of steps must be made to be clearly visible through a visual or textural differentiation such as a strip of contrasting colour or texture

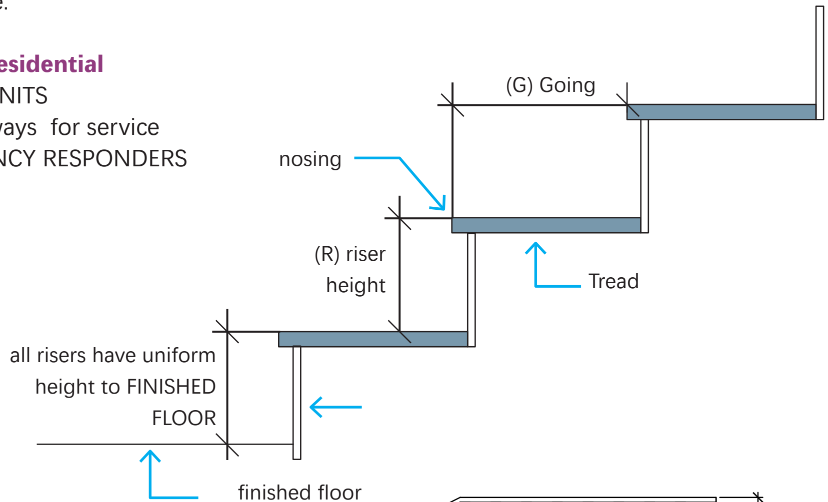
.3 Stairways to non-habitable ROOMS such as attics and storerooms that are not used on a frequent basis, or equipment rooms such as machinery rooms, boiler houses, lift-machine rooms, and the like, can deviate from the standards in this section if they conform with AS 1657.

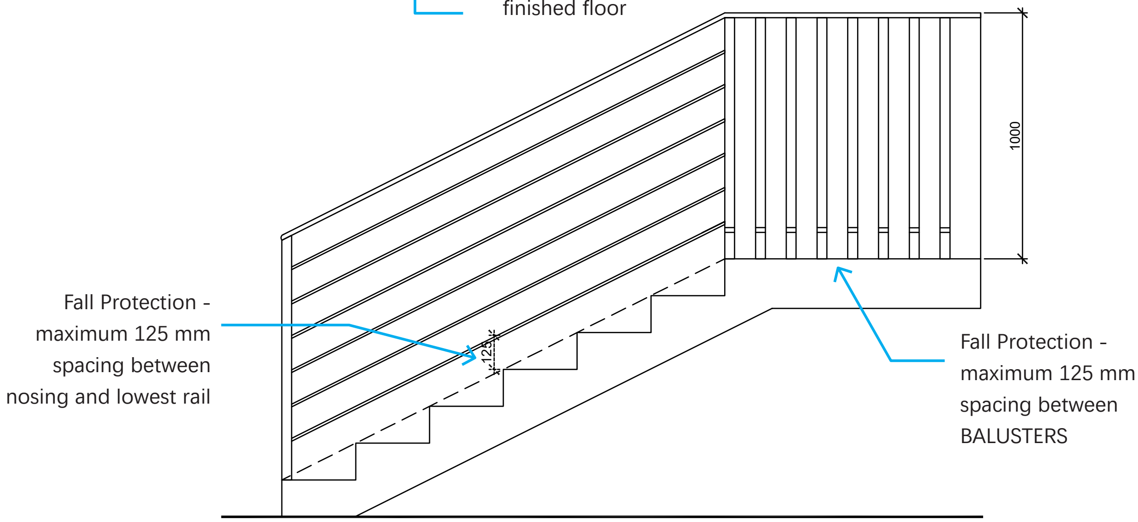
Figure D3.E.2: Going and Riser Size and Configuration

Stairway Use	(R) Riser		(G) Going		(2R+G) Quantity	
	Max	Min	Max	Min	Max	Min
Public	190	115	355	250	700	550
*Private	190	115	355	240	700	550
Spiral	220	140	370	210	680	590

* Private stairways include:

(a) stairs in **Single Unit Residential**
(b) stairs in **Residential** UNITS
(c) restricted access stairways for service personnel or EMERGENCY RESPONDERS





.4 Stairway types, as illustrated in Table D3.E.4, must be appropriate to the function, use and occupancy of the BUILDING, FACILITY or SITE, as well as accessibility requirements, FIRE PROTECTION and user safety.

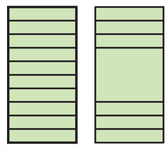
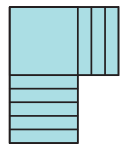
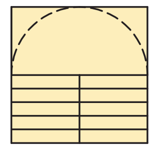
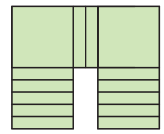
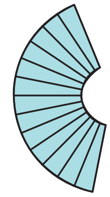
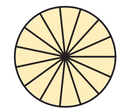
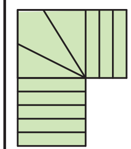
.5 Landings at the top, bottom, and midway between flights must:

(a) have a maximum gradient of 1:50

(b) be a minimum of 750 mm in length, and where this involves a change in direction, the length is measured 500 mm from the inside edge of the landing

.6 Public stairways in all BUILDINGS, FACILITIES and SITES, including non-residential **Sole Occupancy Units** must have a SLIP-RESISTANT surface and/or a suitable SLIP-RESISTANT strip at the edge of the landing adjacent to the treads that complies with AS 4586.

Table D3.E.4: Going and Riser size and Configuration

	Straight	Quarter-Turn	Half-Turn with Landing	Extended Half-Turn	Curved	Spiral	Winders
							
Single Unit Residential	√	√	√	√	√	√	√
Multiple Unit Residential (Public Stairs)	√	√	√	√			
Storage, Utilities	√	√	√				
Office / **Retail**	√	√	√	√	√		
All Other Buildings	√	√	√				

.7 Stair landings in **Health-Care Buildings** must:

(a) be sufficient in area to accommodate the movement of a stretcher (2 m long by 600 mm wide) at a gradient not more than the gradient of the stairs, with at least one end of the stretcher on the landing while changing direction between flights, or

(b) have a minimum area of 1.6 m x 2.7 m where the stair has a change of direction of 180°

D3.F Handrails, Balusters and Glass Panels

.1 A HANDRAIL must:

(a) be located along at least one side of a ramp or flight of stairs less than 2.0 m in width, and on both sides if the width is greater than 2.0 m and/or the stairway is ACCESSIBLE

(b) for non-residential BUILDINGS, FACILITIES and SITES, be located along both sides if the stairway is greater than 3 risers

(c) have a fixed height between 865 mm - 1,000 mm measured from the tread or finished level of the ramp to the top of the HANDRAIL

(d) be continuous for the length of the stair flight, landings and ramp with no obstructions except newel posts, except for **Residential** BUILDINGS where decorative obstructions, such as ball type stanchions or the like, may be used if there is no impact on user safety

(e) extend at least one tread wide plus 300 mm from the last riser (450 mm total) horizontally past the top or bottom tread of a stairway, or the beginning or end of a ramp, except in **Single Unit Residential** BUILDINGS where the HANDRAIL can terminate at the newel post

(f) return to the wall or turn downwards for at least 100 mm

(g) have a minimum clearance of 50 mm from the wall or any obstruction

(h) in REQUIRED ACCESSIBLE BUILDINGS have:
- (i) a contrasting colour to make it visible from the wall
- (ii) domed buttons, or the like, on the top of the rail to assist people with visual impairments

.2 HANDRAILS for the following uses must comply with AS 1657 in lieu of D3.F.1 above:

(a) machinery rooms, boiler houses, lift-machine rooms, plant-rooms, and the like

(b) non-habitable ROOMS such as attics, storerooms and the like that are not used o a frequent or daily basis

.3 HANDRAILS in an ACCESSIBLE EXIT must comply with Clause 12 of AS/NZS 1428.1.

.4 For **Health-Care Buildings**, HANDRAILS must be provided along at least one side of every corridor used by patients, and must be:

(a) fixed not less than 50 mm clear of the wall

(b) continuous for the full length, where practicable

.5 For **Aged-Care Buildings**, HANDRAILS must be provided along both sides of every corridor used by residents, and be:

(a) fixed not less than 50 mm clear of the wall

(b) continuous for the full length, where practicable

.6 BALUSTERS of wood, metal, wire, CABLE, glass or other material may be placed vertically, horizontally, or in a decorative pattern as long as the maximum opening size of 125 mm diameter is maintained between each BALUSTER.

.7 Glass panel barriers for stairs and landings must:

(a) be Grade A SAFETY GLASS and comply with NZS 4223 regarding strength, DURABILITY and placement

(b) have all exposed edges for frameless panels be rounded

.8 The layout and design of BALUSTERS and glass panel barriers for stairs and landings must ensure a maximum opening size of 125 mm diameter is maintained between the BALUSTERS or glass panels and:

(a) the HANDRAIL

(b) nosing of the tread on each step

(c) finished surface of the ramp or landing

(d) any other decorative feature or structural member in the fall protection barrier

Glass panel barrier for stairs and landing

D3.G Ramps

.1 Ramps used as a means of egress for people to a BUILDING, FACILITY or SITE must have a maximum slope of 1 unit vertical to 12 units horizontal (8% slope), unless the use of the ramp, function of the BUILDING and occupancy justifies a steeper incline. Permissible variations to the maximum slope are provided in the Disability Access Guideline, 2008, published by PUMA and any subsequent amendments or similar documents published and approved by the Government of Samoa.

.2 The cross-slope measured perpendicular to the direction of travel must be a maximum of one unit vertical to 48 units horizontal (2% slope).

.3 Maximum length of ramps and landings according to the incline must comply with the Disability Access Guidelines, 2008, published by PUMA and any subsequent amendments or similar documents published and approved by the Government of Samoa.

.4 Ramps must have:

(a) a SLIP-RESISTANT surface, or a suitable SLIP-RESISTANT strip at the beginning and end of the landing in accordance with Table D2.14 Slip Resistance Classification of the Building Code of Australia, Volume 1

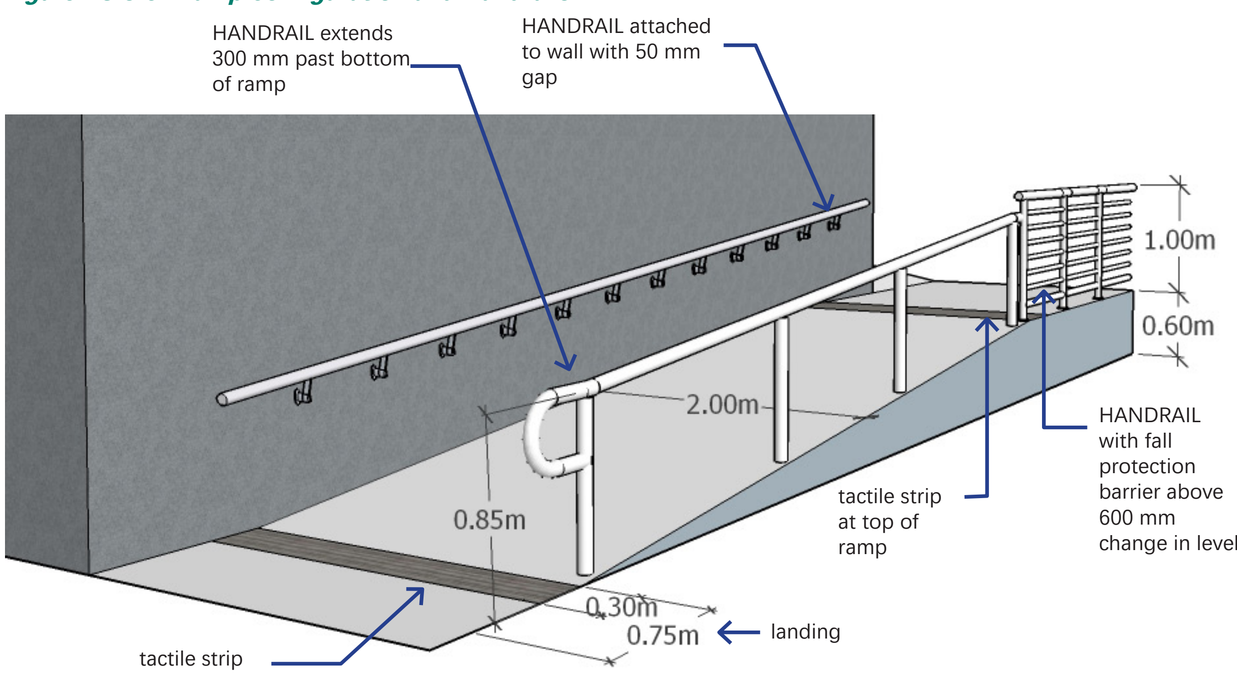
(b) headroom of a minimum of 2.0 m measured from the finished surface of the landing or ramp to an overhead ceiling or structure

(c) be designed so that water will not accumulate on the ramp or landings

.5 Landings must be provided at the bottom and top of a ramp, at points of turning, and where they connect to the threshold of a doorway, and must:

(a) have a maximum gradient of 1:50

Figure D3.G.6: Ramp Configuration and Handrails



(b) have a minimum length of:
   (i) 1,500 mm for an ACCESSIBLE ROUTE
   (ii) 1,200 mm for non-ACCESSIBLE ramps

(c) have a minimum area of 1.5 m by 1.5 m for landings with a change in direction of travel between ramp runs, except in residential UNITS where it may be reduced to 1,000 mm by 1,000 mm

.6 HANDRAILS are required for all ACCESSIBLE ramps, and are not required for a non-accessible ramp where the adjacent grade is level with the ramp or does not exceed a 50 mm change in elevation for a distance of at least 1000 mm in a downward direction, as illustrated in Figure D3.G.6.

.7 Glass barriers (BALUSTERS, fences, or screens) that safeguard occupants from falling 1,000 mm or more are subject to all provisions in Section D3.C Fall Protection in the NBC, in addition to wind load provisions in AS/NZS 1170.

D3.H Window Fall Protection and Human Impact Safety

.1 Windows (see Section D3.H.2 below) and GLAZING (see Section D3.H.3 below) in a BUILDING or FACILITY in BUILDING GROUP 1-3 and Building Group 4 (except **Retail, Fale Tourist Accommodation, Minor** and **Temporary Structures)** must safeguard humans from falling and from injury due to unforeseen human impact during normal operations with any, some, or all of the following:

(a) a device capable of restricting the window from opening

(b) a barrier or screen with secure fittings that prevents movement through the opening

(c) windows and GLAZING being constructed of SAFETY GLASS designed to resist the impact of human contact during normal activities in the BUILDING or FACILITY (see Appendix C for specific requirements)

.2 The following window openings must be protected as indicated in Section D3.H.1 above to prevent an occupant from falling:

(a) windows in a bedroom of a **Residential Building, Health-Care, Aged-Care, Tourist Accommodation,** or any other sleeping accommodation room that is more than 2 m above the ground below

(b) all windows in an early childhood centre

(c) all windows where the top of the sill is less than 1,700 mm above the FINISHED FLOOR

.3 As indicated in Section D3.H.1(c) above, SAFETY GLASS (see Appendix C for type and other requirements) must be used for the following

(a) GLAZING in doors, and door side panels

(b) low level GLAZING - any part of which is located within:
   (i) 800 mm from the FINISHED FLOOR in an early childhood centre
   (ii) 1,000 mm from the FINISHED FLOOR in all other HABITABLE BUILDINGS and structures

(c) within 2,000 mm vertical and 2.000 mm horizontal of a stairway or ramp, consisting of glass BALUSTERS and/or glass panel barriers appropriate to the required protection

(d) in and around WET AREAS (including BATHROOMS, SANITARY COMPARTMENTS, spas, shower doors, vanity doors, mirrors, other partitions.)

(e) GLAZING used as a barrier protecting a fall of 1,000 mm or more, such as a glass panel barrier for a stairway (see Section D3.D above)

(f) in areas used for high risk activities such as gymnasiums, stadiums, and the like
- (i) gymnasiums, sports courts, or marked fields - all GLAZING wholly or partly within 2,000 mm vertically and 5,000 mm horizontally of the sealed surface of sports courts/fields
- (ii) swimming pools - all GLAZING wholly or partly within 2,000 mm vertically or horizontally of the walking surface alongside swimming pools and space
- (iii) **Schools** - all GLAZING in the Safety Zone (within 2,000 mm above the FINISHED FLOOR)
- (iv) early childhood centres - all Low Level GLAZING (within 800 mm above the FINISHED FLOOR)
- (v) **Stadiums**
- (vi) public viewing galleries
- (vii) assembly halls
- (vii) other areas deemed suitable by the Government of Samoa

(g) internal glass walls and mirror walls in non-residential BUILDINGS where the GLAZING is less than 2,000 mm from the FINISHED FLOOR and is not fully backed or adhered to a solid material

(h) shopfronts

(i) sashless windows (will be subject to special design)

(j) window seats

and

(k) does **not** include:

- (i) GLAZING in lift cars and liftwells
- (ii) furniture and cabinet glass, vanities, glass basins, refrigeration units, internal glass fitments, glass wall linings, framed internal wall mirrors, and mirrors
- (iii) BUILDINGS and FACILITIES with no public access intended for non-habitable, horticultural and/ or agricultural use
- (iv) restoration or repair of existing decorated glass
- (v) GLAZING that might fail due to stresses other than tensile stresses, such as glass floors
- (vi) plastic GLAZING materials
- (vii) glass blocks, pavers, slumped, formed or cast glass
- (viii) point-fixed or point-supported systems used for GLAZING, CLADDING, signage

.4 The barrier or screen referred to in D3.H.1(b) above must:

(a) not permit a 125 mm sphere to pass through the portion of the window opening to be protected

(b) resist an outward horizontal action of 250 N against the:
- (i) window restrained by a device, or
- (ii) screen protecting the opening

(c) have a safety release mechanism if the screen or device is able to be removed, unlocked or overridden

(d) have a sufficient height above the FINISHED FLOOR that prevents a person from moving through the window if it opens

.5 To protect humans from potential injury, all GLAZING must meet the standards of the New Zealand Safety Glass Association (NZSGA), or an equivalent acceptable to the Government of Samoa, as well as NZS 4223 Glazing in Buildings, regarding the following (see Appendix C for Specific Requirements):

(a) type of glass

(b) maximum area

(c) minimum nominal thickness

(d) maximum number of vertical butt joints per opening

(e) maximum number of panels per opening

(f) maximum individual panel width

.6 Manifestation of GLAZING (making it visually apparent when it could be mistaken for a doorway or unimpeded path of travel), must be completed for the following:

(a) doors and door side panels

(b) low level GLAZING in early childhood centres and elsewhere where it could be mistaken for an unimpeded path of travel

(c) shower doors and bath enclosures

(d) shopfronts

(e) internal partitions

(f) within 2,000 mm of a stairway or ramp

(g) any GLAZING protecting a fall of 1,000 mm or more

(h) any other area deemed appropriate by the Government of Samoa

.7 Manifestation of GLAZING must not be considered as a substitute for the use of SAFETY GLASS, where required, and must be clearly visible under all conditions of artificial and/or natural lighting.

.8 Manifestation of GLAZING must consist of:

(a) provision of a clearly visible opaque band, motif or other decorative treatment (minimum 20 mm wide) across the full width of the glazed opening at a height:

(i) for an early childhood centre - the centreline positioned 800 mm above the FINISHED FLOOR

(ii) for all other BUILDINGS, the centreline must be between 800 and 1,200 mm above the FINISHED FLOOR

or

(b) other clearly visible demarcation acceptable to the Government of Samoa

.9 Leadlights and decorative glass must have individual panes that do not exceed:

(a) 0.1 m2 for 3 mm annealed glass

(b) 0.3 m2 for 4 mm annealed glass

(c) 0.5 m2 for 5 mm annealed glass

.10 GLAZING that is fully or partially within the Fall Protection Zone and the top of the lower sill is 1,000 mm or more from the FFL or ground level as illustrated in Figure D3.H.9, and the GLAZING is not protected by a barrier or screen as per Section D3.H.1(b), must consist of the following glass types:

(a) fully framed - SAFETY GLASS that complies with Table 7 in Appendix C

(b) partly framed, full height - SAFETY GLASS that complies with Table 8 in Appendix C

(c) other - SUBJECT TO A SPECIFIC DESIGN

D3.I Roof Access

.1 Roof tops without public access must safeguard service personnel from harm who access the roof for maintenance purposes by:

(a) safe and FIRE-RESISTANT access doors and hatches

(b) provision of a 1.2 m minimum height barrier along the perimeter of the roof that may consist of:
- (i) a parapet
- (ii) a fence
- (iii) a railing, or

(c) provision of a barrier surrounding the equipment meant to be serviced, the height, material and style appropriate to the nature of the equipment

Roof top barrier for servicing equipment on a roof with no public access

.2 Roof tops with public access to amenities must ensure that the perimeter of the roof, or an appropriate sized area that safeguards people from falling, must have the following:

(a) safe and FIRE-RESISTANT access doors

(b) provision of a 1.2 m minimum height barrier along the perimeter of the roof that may consist of:

- (i) a parapet
- (ii) a fence
- (iii) a railing
- (iv) a combination of the above

that must not have a horizontal element between 150 mm and 760 mm from the ground plane that could facilitate climbing

ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings - Selection and Installation - Glass Balustrades
AS 1657: 2013 Fixed Platforms, Walkways, Stairways and Ladders - Design, Construction and Installation
AS 1909: 1984 Installation of Timber Doorsets
AS 2047: 2014 Windows and External Glazed Doors in Buildings
AS 2688: 1984 Timber Doors
AS 2689: 1984 Timber Doorsets
AS 4290: 2000 Design and Installation of Revolving Doors
AS 4586: 2013 Slip Resistance Classification of New Pedestrian Surface Materials
AS 5007: 2007 Powered Doors for Pedestrian Access and Egress
AS 5039: 2008 Security Screen Doors and Security Window Grilles
AS 5040: 2003 Installation of Security Screen Doors and Window Grilles

AS/NZS 3661: 1993 Slip Resistance of Pedestrian Surfaces
AS/NZS 4505: 2012 Garage Doors and Other Large Access Doors

NZS 4211: 2008 Specification for Performance of Windows
NZS 4231: 1985 Specification for Self-Luminous Exit Signs
NZS 4239: 1993 Automatic Sliding Door Assemblies

BS 585 Wood Stairs: Part 1: 1989 Specification for Stairs with Closed Risers For Domestic Use, Including Straight and Winder Flights and Quarter or Half Landings
BS 5395: 1984 Stairs, Ladders and Walkways - Code of Practice for the Design of Helical and Spiral Stairs
BS 6037: 1990 Code of Practice for the Planning, Design, Installation and Use of Permanently Installed Access Equipment
BS 7273: 2007 Part 4 Actuation of Release Mechanisms for Doors

BRANZ EM 6: 2001 Evaluation Method for Window and Door Support Mechanisms or Bars

Building Code of Australia, Volume 1
Specification D1.12 Non-Required Stairways, Ramps and Escalators

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- Construction drawings, specifications and/or product sheets for all access routes, means of egress and ACCESSIBLE ROUTES, ACCESSIBLE UNITS and other ACCESSIBLE features

Section E

Hazardous Substances

Contents

Table E1: Section E- Overview of Applicable Sections in the NBC

Section E

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group					Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
		1	2	3	4	5										
E1 Documentation and Approval																
E1.A	Identification and Classification	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E1.B	Hazard Testing Methodology	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E1.C	Recognised Hazardous Substances	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E1.D	Hazardous Building Material	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2 Hazardous Processes																
E2.A	Storage	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2.B	Spill Control	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2.C	Use, Dispensing, Handling and Safety	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2.D	Tanks	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2.E	Hazardous Prevention during Construction and Demolition	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E2.F	Light Pollution Reduction	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E3 Emergency Planning and Warning Systems																
E3.A	Hazardous Substances Management Plan	•	•	•	•		•		•	•	•	•	•	•	•	•
E3.B	Hazardous Materials Inventory Statement	•	•	•	•		•		•	•	•	•	•	•	•	•
E3.C	Signs	•	•	•	•		•		•	•	•	•	•	•	•	•
E3.D	Tracking	•	•	•	•		•		•	•	•	•	•	•	•	•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

E HAZARDOUS SUBSTANCES

Section E OBJECTIVES

E(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, and SITEWORK must:

(a) safeguard people from injury related to storage, dispensing, use and handling of HAZARDOUS SUBSTANCES and processes

(b) minimise the risk of unwanted releases, fires or explosions of HAZARDOUS SUBSTANCES during normal operations and in the event of a catastrophe

E(ii)

The use of HAZARDOUS SUBSTANCES and processes must be regulated through approved documentation, plans, procedures, audits, engineering controls, and the like, to safeguard people and property from unforeseen injury, illness or other ill consequences

E1 Documentation and Approval

REQUIRED PERFORMANCE

REFER TO THE OCCUPATIONAL SAFETY AND HEALTH ACT, 2002, AND THE DISASTER AND EMERGENCY MANAGEMENT ACT, 2007, FOR FURTHER REQUIREMENTS

.1 HAZARDOUS SUBSTANCES contained in BUILDING MATERIAL or that are stored, produced, dispensed or handled in a BUILDING, FACILITY, or SITE must be identified and classified according to approved standards of the Government of Samoa and the New Zealand Environmental Protection Agency, and approved for use by the Government of Samoa.

.2 Documentation of the effects of any HAZARDOUS SUBSTANCE must include consideration of:

(a) intended use of the BUILDING, FACILITY, SITE SERVICING, SITEWORK, or, SITE

(b) the nature, potency, or toxicity of the HAZARDOUS SUBSTANCE

(c) permitted quantities of HAZARDOUS SUBSTANCES

(d) safety measures that protect against harmful effects

.3 Landowners and builders must provide evidence that the following sources of HAZARDOUS SUBSTANCES are approved for use in accordance with policies of the Government of Samoa:

(a) BUILDING MATERIALS and ASSEMBLIES that contain HAZARDOUS SUBSTANCES

(b) any HAZARDOUS SUBSTANCES used, dispensed, handled or manufactured on a SITE or within a BUILDING or FACILITY

DEEMED-TO-SATISFY PROVISIONS

E1.A Identification and Classification

.1 A substance is considered to be HAZARDOUS if:

(a) listed in Appendix E and/or in Schedule 2 of the Waste Management Act, 2010, as amended

(b) it is an ozone-depleting substance or releases GHG emissions in harmful quantities as determined by the Government of Samoa

.2 Evidence that a BUILDING MATERIAL or part thereof is not considered to be HAZARDOUS must be provided by one or more of the following:

(a) HSNO (Hazardous Substances and New Organisms) approval for the product or substance as per the New Zealand Environmental Protection Agency and as approved by the Government of Samoa

(b) providing evidence in reference to the CCID (Chemical Classification and Information Database) published by the New Zealand Environmental Protection Agency (and as approved by the Government of Samoa) that the product or substance is an approved substance

(c) providing a Safety Data Sheet for the HAZARDOUS SUBSTANCE prepared by the manufacturer that provides appropriate information on GHS categories, risk phrases (R-phases) or hazard statements

(d) verifying that the substance is listed on the NZIoC (New Zealand Inventory of Chemicals) list of chemicals allowed as components in products covered under group standard approvals and is approved by the Government of Samoa

(e) verifying that the substance is listed on the New Zealand Controls for Approved Hazardous Substances database published by the New Zealand Environmental Protection Agency and is approved by the Government of Samoa

(f) in areas of the BUILDING or SITE that are ACCESSIBLE to the public, ensuring that exposure limits for the following are within acceptable ranges according to the Government of Samoa and the New Zealand Environmental Protection Agency:

(i) TEL - the maximum concentration of a HAZARDOUS SUBSTANCE legally allowable in a particular environmental medium

(ii) WES - Workplace Exposure Limits - to protect people in their workplaces from the adverse effects of toxic substances.

(iii) EEL - Environmental Exposure Limits - the maximum concentration of an ecotoxic substance legally allowable in a particular environmental medium (eg, water, soil or sediment)

(g) undertaking an approved methodology, such as the HSNO testing of the HAZARDOUS properties of a substance, and achieving acceptable results satisfactory to the Government of Samoa and the policies of the New Zealand Environmental Protection Agency

(h) other approved and recognised methods of identifying the HAZARD potential of a material used by an internationally recognised environmental protection agency, and is acceptable to the Government of Samoa

E1.B Hazard Testing Methodology

.1 An acceptable methodology to determine whether a BUILDING, FACILITY, activity on SITE or BUILDING MATERIAL is considered HAZARDOUS and could cause serious harm must include all of the following:

(a) detailed description of each harm and potential harm

(b) analysis of the likelihood of an injury or harm occurring

(c) estimate of how many people are likely to be exposed to the HAZARD and for how long

(d) description of the consequence of each HAZARD

(e) risk assessment (low / moderate / high / extreme)

(f) projection of residual risk that could occur once control measures are in place

.2 A HAZARDOUS SUBSTANCES rating tool for risk assessment (according to Section E1.B.1(e) above) must consider the degree of injury that could result from the presence and use of HAZARDOUS SUBSTANCES, as shown in the example illustrated in Table E1.B.2 during an appropriate time period.

Table E1.B.2: Priority for Action to Mitigate Harmful Impacts from Hazardous Substances

Injury or Harm to Health				
Likelihood of Injury from HAZARDOUS SUBSTANCE	**Insignificant** no injuries	**Moderate** first aid / medical treatment	**Major** extensive injuries	**Catastrophic** fatalities
Very Likely	High	Extreme	Extreme	Extreme
Likely	Moderate	High	Extreme	Extreme
Moderate	Low	High	Extreme	Extreme
Unlikely	Low	Moderate	High	Extreme
Highly Unlikely	Low	Moderate	High	High

.3 The online calculator published by the New Zealand WorkSafe website (Major Hazard Facility Calculator) can be used to determine if a facility is a MAJOR HAZARD FACILITY (MHF). For any MHF, the regulations of the New Zealand Health and Safety, and the policies of the Government of Samoa apply for the construction of any BUILDING, FACILITY, SITEWORK and SITE SERVICING.

.4 The maximum amount of HAZARDOUS SUBSTANCES permitted on a SITE must be according to best practices as per the New Zealand Environmental Protection Agency, the Government of Samoa, and other recognised and accredited approval agencies acceptable to the Government of Samoa.

E1.C Recognised Hazardous Substances

.1 A COMPLIANT SPRINKLER SYSTEM (see Section C7.D for installation details) or other appropriate suppression system must be provided and operational throughout the LIFESPAN of the BUILDING, FACILITY, SITEWORK, or other activities on SITE for the following BUILDING FUNCTIONS in appropriate locations:

(a) aircraft hangars

(b) cane furnishing manufacture, processing and storage

(c) fire-lighter and fireworks manufacture and warehousing

(d) foam plastic and foam plastic goods manufacture, processing and warehousing e.g. furniture factory, foam rubber goods manufacturing and/or processing

(e) hydrocarbon based sheet product, manufacture, processing and warehousing e.g. vinyl floor coverings

(f) woodwool and other FLAMMABLE loose fibrous material manufacture

(g) electrical / electronic manufacturing and assembly (predominantly plastic components)

(h) FLAMMABLE liquid spraying

(i) nitrocellulose and nitrocellulose goods manufacturing

(j) paint and varnish works, solvent based

(k) plastic goods manufacturing and/or processing works

(l) resin and turpentine manufacturing

(m) vehicle repair shops

.2 A BUILDING or FACILITY that stores, produces, dispenses or handles the following HAZARDOUS SUBSTANCES with an aggregate volume exceeding 2,000 m^3 and stored at a height greater than 4 m must be protected by a COMPLIANT SPRINKLER SYSTEM or other appropriate suppression system throughout the entire structure:

(a) aerosol packs with FLAMMABLE contents

(b) carpets and clothing

(c) electrical appliances

(d) COMBUSTIBLE compressed fibreboards (low and high density) and plywoods

(e) COMBUSTIBLE cartons, irrespective of content

(f) esparto and other fibrous COMBUSTIBLE material

(g) furniture including timber, cane and composite, where foamed rubber or plastics are incorporated

(h) paper storage (all forms of new or waste) e.g. bales, sheet, horizontal or vertical rolls, waxed coated or processed

(i) textiles raw and finished, eg, rolled cloth, clothing and manchester

(j) plastic, rubber, vinyl and other sheets in the forms of offcuts, random piece or rolls

E1.D Hazardous Building Material

.1 HAZARDOUS SUBSTANCES that are banned by the Government of Samoa may not be a component in a BUILDING MATERIAL or ASSEMBLY.

.2 To limit risk / exposure during construction, operation, alteration, maintenance and demolition, BUILDING MATERIALS and ASSEMBLIES must have minimal use of the following HAZARDOUS SUBSTANCES:

(a) lead, mercury and other heavy metals

(b) PCB (polychlorinated biphenyl, an organic chlorine compound)

(c) radioactive materials / radon gas

(d) mould / microbial growth - see Section F3.B Mould Prevention

(e) crystalline silica

(f) explosives and COMBUSTIBLE material

(g) asbestos - see Section B4.B.3 Building Materials

.3 Emission of harmful quantities of HAZARDOUS gas, liquid, radiation or solid particles during construction and/or from the use of the BUILDING or SITE must not give rise to harmful concentrations at the surface or in the atmosphere of any space.

ACCEPTABLE SOLUTIONS

ISO 3864: 2002 Safety Colours and Safety Signs
ISO 7000: 2004 Graphic Symbols for Use on Equipment
ISO 7010: 2003 Graphical Symbols - Safety Colours and Safety Signs Used in Workplaces and Public Areas

BSDD 175: 1988 Code of Practice for the Identification of Potentially Contaminated Land and its Investigation

HSNO Code of Practice 2-1 09-04 Signage for Premises Storing Hazardous Substances and Dangerous Goods

Asbestos - New Zealand Guidelines For The Management And Removal Of Asbestos (3rd Edition)

Australian and New Zealand Environment and Conservation Council - Guidelines for Assessment and Management of Contaminated Sites: 1992

CCID (Chemical Classification and Information Database) published by the New Zealand Environmental Protection Agency

Department of Labour, New Zealand, 1992: Workplace Exposure Standards and Biological Indices

New Zealand Policy / Standards
NZIoC (New Zealand Inventory of Chemicals)
New Zealand Controls for Approved Hazardous Substances database published by the New Zealand Environmental Protection Agency
New Zealand WorkSafe website (Major Hazard Facility Calculator)

New Zealand Legislation
Hazardous Substances and New Organisms Act 1996
Hazardous Substances (Classification) Regulations 2001
Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001
Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004
Hazardous Substances (Disposal) Regulations 2001
Hazardous Substances (Emergency Management) Regulations 2001
Resource Management (National Environment Standards Relating to Certain Pollutants, Dioxins and other Toxins) Regulations: 2004 (NESAQ)

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- List of HAZARDOUS SUBSTANCES that are part of any BUILDING MATERIAL or will be used, dispensed or handled on the property
- List of classifications and approvals for all HAZARDOUS SUBSTANCES to be used, dispensed or handled from the following lists published by the New Zealand Environmental Protection Agency:
  - (a) HSNO Hazardous Substances and New Organisms approval sheet
  - (b) CCID Chemical Classification and Information Database
  - (c) NZIoC New Zealand Inventory of Chemicals and the Controls for Approved Hazardous Substances database
- Safety Data Sheets issued by the manufacturer of a product or BUILDING MATERIAL containing HAZARDOUS SUBSTANCES
- Identification of whether the is considered a MHF Major Hazardous Facility
- Verification and other documentation for HAZARDOUS SUBSTANCES that support their safe usage

E2 Hazardous Processes

REQUIRED PERFORMANCE

.1 BUILDINGS or SITES where HAZARDOUS SUBSTANCES are stored, produced, dispensed or handled must:

(a) safeguard people and property from the consequences of unauthorised discharge, fires or explosions

(b) have acceptable means of:
- (i) safe storage of HAZARDOUS SUBSTANCES
- (ii) safe operation and maintenance
- (iii) safe removal of HAZARDOUS SUBSTANCES, if applicable
- (iv) securing the SITE against unauthorised entry

.2 Equipment and operations involving HAZARDOUS SUBSTANCES must be designed, installed and maintained to ensure they operate as intended.

.3 Where a spill is determined to be a plausible event that would endanger people, environment or property, spill containment systems or means to render a spill harmless to people or property must be part of the construction and operation of the BUILDING, FACILITY or SITE.

.4 Safeguards must be provided to minimise the risk of exposing COMBUSTIBLE HAZARDOUS SUBSTANCES to unintended sources of ignition and to limit damage from a fire or explosion.

.5 Safeguards must be provided to minimise the risk of exposing HAZARDOUS SUBSTANCES to physical damage that could endanger people or property.

.6 Where a release of a HAZARDOUS SUBSTANCE could cause immediate harm to persons or property, means of mitigating the dangerous effects of a release must be provided, such as showers, eye baths, railing to aid the blinded, etc., appropriate to the HAZARDOUS SUBSTANCE.

.7 HAZARDOUS SUBSTANCES stored in a BUILDING, FACILITY, or SITE, or generated through an activity in the BUILDING, FACILITY or SITE, in any quantity, must not be released into a RETICULATED system (RETICULATED STORMWATER SYSTEM, RETICULATED WATER SUPPLY, or RETICULATED WASTEWATER SYSTEM), DRAINAGE DITCH, creek, stream, river, pond, lake, ocean or on the ground, sidewalk, street, highway or into the atmosphere, unless:

(a) the release or emission of HAZARDOUS SUBSTANCES is allowed in compliance with other laws, regulations or policies of the Government of Samoa

(b) the use of pesticides, fertilisers and soil amendments is permitted and is in accordance with registered label directions

.8 Light pollution from BUILDINGS, FACILITIES and SITES that has a detrimental impact on the environment or enjoyment of property is considered to be a HAZARD and must be minimised through appropriate selection, placement and design of lighting components, intensity and fixtures, see Section.

DEEMED-TO-SATISFY PROVISIONS

E2.A Storage

.1 BUILDINGS and SITES must provide appropriate storage for HAZARDOUS SUBSTANCES, including separating substances with a high potential for danger into separate structures, FIRE COMPARTMENTS (in accordance with Section C3 of the NBC) or parts of the property according to best practices of relevant authorities within the Government of Samoa and New Zealand Environmental Protection Agency.

.2 Appropriate FIRE-RESISTING CONSTRUCTION must be used for storage of HAZARDOUS SUBSTANCES as well as provisions for fire prevention, fire spread reduction, protection of openings, FIRE SAFETY SYSTEM, SMOKE CONTROL SYSTEM, and EMERGENCY RESPONDER operations as per Section C.

.3 **Storage Building** interiors must be treated, coated and constructed of BUILDING MATERIAL that are non-reactive with any HAZARDOUS SUBSTANCE being stored.

.4 Storage areas for HAZARDOUS SUBSTANCES within a BUILDING, FACILITY or SITE must be designed and constructed so that harmful fumes are not released to other parts of the structure or to the outside be any, some or all of the following:

(a) constructed to be AIRTIGHT

(b) ventilated with an AIRTIGHT exhaust that releases to an approved location

(c) ventilated in a closed system

.5 Storage areas for liquid or solid HAZARDOUS SUBSTANCES must provide spill control and secondary containment.

.6 Storage of HAZARDOUS SUBSTANCES that are shock-sensitive must be sufficiently padded, suspended or otherwise protected against accidental dislodgement during seismic activity or other DISASTER.

.7 Adequate separation of incompatible HAZARDOUS SUBSTANCES must be accomplished through any, some or all of the following:

(a) segregating incompatible material in storage by a minimum of 6.0 m, where such separation will not create a dangerous or harmful situation, and the material does not have a high potential for danger (in which case it must comply with Section E2.A.1 above)

(b) isolating incompatible material by a NON-COMBUSTIBLE partition extending a minimum of 450 mm above and to the side of the stored material

(c) storing liquid and solid materials in HAZARDOUS SUBSTANCES storage cabinets designed for that purpose

(d) storing compressed gases in gas cabinets or enclosures, and separating incompatible materials into different cabinets or enclosures

.8 Outdoor storage of HAZARDOUS SUBSTANCES must be kept free from vegetation exceeding 1.0 m in height, debris and COMBUSTIBLE material for a minimum distance of 4.5 m surrounding the storage area.

.9 Shelving used to store HAZARDOUS SUBSTANCES must be structurally adequate to carry the load.

.10 Materials that must be stored at temperatures other than normal ambient temperatures to prevent a HAZARDOUS reaction must be provided with an approved means to maintain the temperature in a safe range, and any such safety measure must continue operating upon failure of the primary temperature control system.

.11 Stationary tanks and equipment containing HAZARDOUS SUBSTANCES stored in a pressurised state must have some form of construction or other approved means to relieve excessive internal pressure to an approved location.

E2.B Spill Control

1. Emergency procedures by the Disaster Management Office and other divisions of the Government of Samoa must be followed in the event of a spill or unintended release of a HAZARDOUS SUBSTANCE, and provision for appropriate emergency procedures and prevention of potential DISASTERS must be incorporated into the design of BUILDINGS, FACILITIES and SITES.

.2 Floors in indoor locations and hard surface material in outdoor locations where liquid or solid HAZARDOUS SUBSTANCES are dispensed or used must be constructed to contain a spill and/or convey it to a suitable location where it will not cause harm to people, property or the environment by using any, some, or all of following methods appropriate to the properties of the HAZARDOUS SUBSTANCES:

(a) liquid-tight, NON-COMBUSTIBLE, recessed or sloped floors (minimum 1% slope)

(b) provision of liquid-tight, NON-COMBUSTIBLE raised or recessed sills, dikes or FLOOR DRAINS

(c) sumps and collection systems

(d) other approved engineered systems that are NON-COMBUSTIBLE with a liquid-tight seal compatible with the stored material

.3 Secondary containment in a storage area for HAZARDOUS SUBSTANCES must consist of a drainage system leading to an approved location or other approved engineered system, and must separate incompatible materials.

.4 FLOOR DRAINS in secondary containment systems must be sized to carry the volume of water that would be released from a COMPLIANT SPRINKLER SYSTEM in case of an emergency, or the volume of a 100-year storm event in outdoor storage areas.

E2.C Use, Dispensing, Handling and Safety

.1 BUILDINGS, FACILITIES, SITEWORK and activities on SITE involving dispensing and use of HAZARDOUS SUBSTANCES in open containers must:

(a) have a mechanical exhaust ventilation system sufficient to capture harmful gases, fumes, mists or vapours at the point of generation

(b) use explosion control measures where an explosion could occur due to the characteristics and usage of the HAZARDOUS SUBSTANCES

(c) be located in a FIRE COMPARTMENT of appropriate FIRE-RESISTANCE

(d) have a FIRE SAFETY SYSTEM appropriate for the use and potential danger

.2 Closed containers or a closed system must be suitable for the use intended, and designed to prevent materials from entering or leaving the system other than at an intended time, rate or path.

.3 Closed systems that are designed to be opened as part of normal operations must be provided with adequate ventilation that prevents HAZARDOUS SUBSTANCES from contaminating the BUILDING or outside air.

.4 Outdoor dispensing and use areas for HAZARDOUS SUBSTANCES must be located and designed to not endanger contamination of GROUNDWATER and SURFACE WATER, and will not have other adverse effects on the natural environment.

.5 All equipment involved in the use, dispensing and handling of HAZARDOUS SUBSTANCES, and the detection, alarm and emergency equipment associated with them, must be maintained in a safe and operable condition during the life cycle of the HAZARDOUS SUBSTANCE.

.6 Facilities to treat persons contaminated by HAZARDOUS SUBSTANCES must be provided as appropriate to the type of HAZARD, such as a shower and soap-factory providing cleansing materials appropriate for the type of HAZARDOUS SUBSTANCE.

E2.D Tanks

.1 Underground tanks used for storage of liquid HAZARDOUS SUBSTANCES must have

(a) secondary containment (as described in Section E2.B.3), or

(b) other engineered solution acceptable to the Government of Samoa

.2 Outdoor stationary tanks storing HAZARDOUS SUBSTANCES must be suitably marked (identified) and:

(a) be located so as not to endanger or contaminate GROUNDWATER and SURFACE WATER nor adversely affect other components of the natural environment

(b) be protected from weather, where weather would adversely affect the conditions of the tank to safely store the HAZARDOUS SUBSTANCE

(c) be braced, padded, and/or anchored if located in an earthquake zone

(d) be safeguarded from vandalism or tampering

(e) provide spill protection as per Section E2.B, or be installed in a FIRE-RESISTANT, DISASTER-RESILIENT vault designed to protect the tank from adverse effects of weather, fire and DISASTERS

.3 Empty containers and tanks previously used to store HAZARDOUS SUBSTANCES must be free from residual HAZARDOUS residue and vapour, or be considered as a HAZARDOUS SUBSTANCE and subject to all applicable regulations.

.4 Defective containers and tanks must be removed from service, repaired or disposed of in an approved manner.

.5 Tanks out of service for 90 days or more must be tested in an approved manner before resuming usage.

E1.E Hazard Prevention During Construction and Demolition

.1 Construction Documents must contain provisions for the following best practices during construction and demolition:

(a) protect authorised personnel from injury resulting from falling objects, fire, blasts, tripping, falling or an other risk posed by the construction or demolition operation

(b) prevent the entry of unauthorised personnel on the construction or demolition site

(c) protect property off site from damage resulting from any activity during construction or demolition

.2 Safety procedures during construction or demolition must limit the accumulation of COMBUSTIBLE materials on site and safeguard equipment and operations from ignition sources.

.3 The structure and SITE under construction must be protected from damage due to wind, rain or other NATURAL DISASTERS likely to occur during construction.

.4 Exposure to HAZARDOUS SUBSTANCES that are known health HAZARDS must be limited to levels acceptable to the Government of Samoa.

E1.F Light Pollution Reduction

.1 Unnecessary illumination of adjacent properties must be avoided except for the following:

(a) temporary holiday decorations

(b) flag lighting on public properties

(c) emergency lighting, aerial lasers, search lights, flashing lights

(d) non-conforming lighting installed prior to the passing of the NBC

.2 A Lighting Plan by a qualified PROFESSIONAL CONSULTANT must be submitted for all DEVELOPMENT in BUILDING GROUPS 1-3, and demonstrate:

(a) ENERGY EFFICIENCY

(b) prevention of light trespass or glare onto adjacent properties through any, some or all of the following:

(i) fixture shielding
(ii) lighting intensity control designed into the fixture
(iii) appropriate fixture location
(iv) appropriate fixture height
(v) fixture aim and directional lighting

(c) lighting intensity levels to the use of the BUILDING, FACILITY and/or SITE

.3 Requirements for illuminated signage by the Government of Samoa must be complied with.

ACCEPTABLE SOLUTIONS

AS 1940: 2004 Storage and Handling of Flammable and Combustible Liquids
AS 2118.1: 1999 Automatic Fire Sprinkling Systems

BS EN 1490: 2000 Building Valves - Combined Temperature and Pressure Relief Valves, Tests and Requirements
BS EN 1491: 2000 Building Valves - Expansion Valves, Tests and Requirements
BS EN 1567: 1999 Building Valves - Water Pressure Reducing Valves and Combination Water Reducing Valves
BS 7777: 1993 Flat Bottomed, Vertical, Cylindrical Storage Tanks for Low Temperature Service
BS EN 12285: 2003 Workshop Fabricated Steel Tanks

Part 1: 2003 Horizontal Cylindrical Single Skin and Double Skin Tanks for Underground Storage of Flammable and Non-Flammable Water Polluting Liquids

Part 2: 2005 Horizontal Cylindrical Single Skin and Double Skin Tanks for the Above Ground Storage of Flammable and Non-Flammable Water Polluting Liquids

BS EN 13121-3: 2008 GRP Tanks and Vessels for Use Above Ground, Design and Workmanship

Above Ground Fuel Storage on Farms Good Practice Guide, published by WorkSafe New Zealand

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS

- Documentation for all HAZARDOUS SUBSTANCES indicating usage, storage, Safety Data Sheets

E3 Emergency Planning and Warning Systems

REQUIRED PERFORMANCE

.1 BUILDINGS, FACILITIES SITEWORK and SITES must contain suitable emergency planning, equipment and warning systems necessary to prevent, avert, handle and mitigate any emergency or DISASTER as a consequence of HAZARDOUS SUBSTANCES in use or stored on the property.

.2 BUILDINGS, FACILITIES and activities on SITES that use, dispense, store or are constructed of HAZARDOUS SUBSTANCES must have a Hazardous Substances Management Plan prepared according to the policies of the Government of Samoa that includes procedures for the following:

(a) state of the HAZARDOUS SUBSTANCE when it enters and leaves the property

(b) state and changes in state of the HAZARDOUS SUBSTANCE during normal operating procedures

(c) lifecycle endpoint (manner of disposal, quantity, location)

.3 In addition to Section E3.2 above, an Emergency Procedures Plan for a BUILDING, FACILITY or SITE with HAZARDOUS SUBSTANCES must be prepared prior to occupancy to safeguard occupants and EMERGENCY RESPONDERS during an emergency, and include:

(a) measures to identify and detect the emergency

(b) measures for initial response after an emergency occurs

(c) location, capacity and use of FIRE SAFETY SYSTEM (Section C7 and C8) and other emergency equipment

(d) procedures for warning and evacuation

(e) procedures for aftermath

.4 A suitable warning system for an emergency must be planned, installed, maintained, tested and operated for the lifecycle of the BUILDING, FACILITY or SITE appropriate to the nature of the HAZARDOUS SUBSTANCES and their use.

.5 The Warning System for HAZARDOUS SUBSTANCES must be coordinated, designed, installed and operated along with the FIRE SAFETY SYSTEM, SMOKE CONTROL SYSTEM, and EMERGENCY RESPONDER operations in Section C7and C8 above where it is advantageous to do so and in the best interest of safety for people and property.

.6 Physical and health-hazard properties of HAZARDOUS SUBSTANCES, dangers, volatility, safety and accident prevention procedures must be made known to occupants, employees, surrounding neighbours and EMERGENCY RESPONDERS.

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DEEMED-TO-SATISFY PROVISIONS

E3.A Hazardous Substances Management Plan

.1 Prior to occupancy, a Hazardous Substances Management Plan (HSMP) must be prepared to the satisfaction of the Government of Samoa for BUILDINGS and SITES that store, use and generate HAZARDOUS SUBSTANCES, and must:

(a) be updated not less than annually

(b) contain operating procedures and procedures for emergency shut down

(c) contain a written plan for management of change

(d) contain written procedures for investigation of accidents, documentation procedures when accidents occur, expected consequences, and actions to mitigate the DISASTER

(e) contain procedures for periodic safety audits

(f) contain a closure plan for the BUILDING, FACILITY and/or SITE

.2 The HSMP must describe and illustrate the following for HAZARDOUS SUBSTANCES:

(a) storage and use areas including the location and dimensions of aisles

(b) maximum amount of each material stored or used, and maximum permitted amounts

(c) range of container sizes

(d) locations of emergency isolation and mitigation valves and devices

(e) location of piping containing liquids or gases

(f) on and off positions of valves of the self-indicating type

(g) location and type of emergency equipment, emergency lighting, EVACUATION ROUTES

(h) location and signage for showers, soap factories, and other emergency contaminant removal facilities

E3.B Hazardous Materials Inventory Statement

.1 For all BUILDINGS and FACILITIES containing HAZARDOUS SUBSTANCES (except **Single Unit Residential** BUILDINGS and UNITS in **Multiple Unit Residential Buildings**), a Hazardous Materials Inventory Statement for all HAZARDOUS SUBSTANCES must be maintained on-site or be readily available through approved means, and list:

(a) manufacturer's name, chemical name, trade names, HAZARDOUS ingredients

(b) HAZARD classification

(c) MSDS (Material Safety Data Sheet) or equivalent

(d) CCID number and other identification numbers assigned to the substance through the standards of the New Zealand Environmental Protection Agency

(e) maximum quantity stored or used on-site storage conditions, storage type, temperature and pressure

E3.C Signs

.1 The number, contents and placement of warning signs for HAZARDOUS SUBSTANCES must comply with requirements of SFESA (Samoa Fire and Emergency Services Authority) and DMO, but in general will be placed at suitable entrances to the BUILDING, FACILITY or SITE, and at the access to rooms or outdoor areas containing HAZARDOUS SUBSTANCES.

.2 The location, size, colour and content of signs and labels on fire suppression or emergency equipment must be to the satisfaction of SFESA (Samoa Fire and Emergency Services Authority), and based on the usage, occupancy and layout of the BUILDING, FACILITY and/or SITE.

.3 Signs must have the following characteristics:

(a) be easy to read and understood from a minimum distance of 10 metres

(b) have lettering large enough to be easily read from a distance of 3.5 m

(c) have wording in Samoan and English, or suitable pictograms

(d) accommodate a PERSON WITH A DISABILITY

E3.D Tracking

.1 Tracking records for HAZARDOUS SUBSTANCES must contain:

(a) name, identification and quantity of the substance

(b) exact location of the substance

(c) name and contact details of the approved handler in control of the substance

(d) storage, processing and use of the substance

(e) details of any transfers of the substance to another location

(f) details of any disposal of substance

.2 Tracking records will be monitored by the Government Samoa and must be submitted for review at the request of the appropriate government agencies.

ACCEPTABLE SOLUTIONS

AS 1670: 1986 Fire Detectors in Exhaust Ducts
AS 2118: 1999 Automatic Fire Sprinkler Systems
Part 1: General Requirements
Part 4: Sprinkler Protection for Accommodation Buildings not Exceeding Four Storeys
Part 6: Combined Sprinkler and Hydrant Systems in Multi-Storey Buildings
AS 1851: 2005 Maintenance of Fire Protection Equipment
AS 2293: 2005 Emergency Escape Lighting and Exit Signs for Buildings
AS 2441: 2005 Installation of Fire Hose Reels
AS 2444: 2001 Portable Fire Extinguishers and Fire Blankets - Selection and Location

AS/NZS 1668.1: 2015 The Use of Ventilation and Air conditioning in Buildings: Fire and Smoke Control
AS/NZS 1670: 2004 Fire Detection, Warning, Control and Intercom Systems
Part 1: Fire
Part 2: Fire Alarm Monitoring
Part 4: Sound Systems and Intercom Systems for Emergency Purposes
AS/NZS 2293: 2005 Emergency Evacuation Lighting for Buildings
AS/NZS 2381: 2008 Electrical Equipment for Explosive Atmospheres - Selection, Installation and Maintenance

Australian Building Codes Board - International Fire Engineering Guidelines: 2005

NZS 2139: 1967 Heat Activated Fire Detectors
NZS 4231: 1985 Specification for Self-Luminous Exit Signs, Amend: A
NZS 4512: 2010 Fire Detection and Alarm Systems in Buildings
NZS 4514: 2009 Inter-Connected Smoke Alarms for Houses
NZS 4515: 2009 Fire Sprinkler Systems for Life Safety in Sleeping Occupancy (up to 2,000 m^2)
NZS 4541: 2013 Automatic Fire Sprinkler Systems
NZS 6742: 1971 Code of Practice for Emergency Lighting in Buildings

BS 5446: 2000 Components of Automatic Fire Alarm Systems for Residential Premises

ISO 13571: 2007 Life-Threatening Components of Fire - Guidelines for the Estimation of Time Available for Escape

Building Code of Australia, Volume 1
Specification E1.8 Fire Control Centres
Specification E2.2a Smoke Detection and Alarm System
Specification E4.8 Photo-Luminescent Exit Signs
Specification E1.5 Fire Sprinkler Systems
Specification G3.8 Fire and Smoke Control Systems in Containing Atria

Managing Risks of Hazardous Chemicals in the Workplace: Code of Practice, July, 2014, published by NSW Government, Australia and SafeWork Australia

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Hazardous Substances Management Plan for all buildings and SITES that use, dispense and handle HAZARDOUS SUBSTANCES in sufficient quantity to be harmful to people and property
- Hazardous Material Inventory Statement for all applicable HAZARDOUS SUBSTANCES used in the construction, alteration or demolition of a BUILDING, FACILITY or SITE
- Tracking Records to be submitted for HAZARDOUS SUBSTANCE as required by SFESA (Samoa Fire and Emergency Services Authority) or other government agency, and at a schedule specified in conditions of the BUILDING PERMIT

Section F

Interior

Contents

Table F1: Section F - Overview of Applicable Sections in the NBC

Section F

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
F1 Room Size and Noise Reduction																
F1.A	Interior Dimensions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F1.B	Noise Attenuation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F2 Air Quality, Ventilation and Temperature																
F2.A	Indoor Air Quality	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F2.B	Room Temperature	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F2.C	Ventilation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F2.D	Air Conditioning	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F3 Wet Area Health and Safety																
F3.A	Wet Area Protection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F3.B	Mould Prevention	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F3.C	Number of Sanitary Compartments Required	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F4 Lighting																
F4.A	Lighting Controls	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F4.B	Natural Lighting	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F4.C	Artificial Lighting	•	•	•	•	•	•	•	•	•	•	•	•	•		•
F4.D	Renewable Energy Lighting	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F5 Finishes on Walls, Ceilings and Floors																
F5.A	Non-Corrosive Steel Finishes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F5.B	Environmental Performance of Interior Finishes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F6 Food Preparation and Refrigeration																
F6.A	Kitchen Safety and Hygiene	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
F6.B	Commercial and Industrial Refrigeration Systems	•	•	•	•		•		•	•	•	•	•	•		•
F6.C	Ventilation in Food Premises	•	•	•	•		•		•	•	•	•	•	•		•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

F INTERIOR

Section F OBJECTIVES

F(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, and SITEWORK must:

(a) safeguard people from harmful interior living conditions such as foul odour, moisture and transmission of disease

(b) safeguard people from injury or loss of amenity caused by inadequate activity space.

(c) safeguard people from loss of amenity as a result of excessive noise being transmitted between adjacent tenants or occupancies

(d) safeguard people from injury or loss of amenity due to lack of adequate lighting

(e) safeguard people from illness or loss of amenity due to lack of air freshness

F1 Room Size and Noise Reduction

REQUIRED PERFORMANCE

.1 Room size, AIRTIGHT construction, minimum ceiling height, and number of occupants, must create a safe and comfortable living environment.

.2 A HABITABLE ROOM or space must have sufficient size to enable the room or space to fulfil its intended use.

.3 Every BUILDING must be designed and constructed in such a way to limit the transmission of source noise from normal domestic type activities through a wall or floor, between a room and internal space where noise is likely to occur, to a level that will not cause inconvenience to occupants.

DEEMED-TO-SATISFY PROVISIONS

F1.A Interior Dimensions

.1 Minimum ceiling height for all HABITABLE BUILDINGS must be 2.4m except for the following:

(a) 3.0 m minimum height for an operating room or delivery room of a **Health-Care** or **Aged-Care Building**

(b) 2.1 m minimum height for:

(i) a kitchen, laundry and/or storage room
(ii) the area above a stairway, ramp, landing, and the like, measured vertically above the nosing of stairway treads or the floor surface of the stairway, ramp, or landing
(iii) a BATHROOM, shower room, SANITARY COMPARTMENT, airlock, tea preparation room, pantry, store room, PRIVATE GARAGE, car parking area, or the like
(iv) a corridor or the like in a **Single Unit Residential** BUILDING

(c) 2.7 m minimum height for a theatre, public hall or other ASSEMBLY BUILDING or room that accommodates more than 100 persons, and the corridor leading to it

(d) where it can be demonstrated that a ceiling height less than 2.4 m is the only viable option for the room

.2 Access openings to an attic space greater than 1,000 mm in height must:

(a) be of sufficient size to admit a fire fighter with fire-suppression gear

(b) have sufficient headroom so that entry into the attic can be secured

(c) be located in a space that is easy to access such as a hallway, lobby, foyer, vestibule or the like

F1.B Noise Attenuation

.1 Air-borne transmission of sound through tenant separation walls and floors must be reduced to a level that minimises its effect on adjacent occupants according to the Government of Samoa noise policy standards.

.2 Appropriate INSULATION to reduce sound transmission must be installed in:

(a) walls, floors and ceilings that separate adjoining UNITS

(b) walls, floors and ceilings of bedrooms

.3 To reduce sound transmission, EXTERNAL WALLS must be at least 100 mm in nominal depth and finished:

(a) on the outside with solid sheathing and a continuous building wrap under an approved EXTERNAL WALL finish

(b) on the interior with gypsum board, plaster at least 125 mm thick, or other continuous BUILDING MATERIAL, installed on the STUDS.

.4 BATHROOM, laundry and similar exhaust ducts connecting the interior space to the outdoors must contain at least a 1.5m of internal sound-absorbing duct lining.

.5 PLUMBING must be lined with sound-absorbent lining where passing through HABITABLE ROOMS.

ACCEPTABLE SOLUTIONS

AS/NZS 1276.1: 1999 Acoustics - Rating of Sound Insulation in Buildings and Building Elements - Airbourne
AS/NZS 2460: 2002 Acoustics - Measurement of the Reverberation Time of Rooms
AS/NZS 2499: 2000 Acoustics - Measurements of Sound Insulation in Buildings and of Building Elements

ASTM E336 .16: 2016 Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings

BS EN ISO 3382-3: 2012 Acoustics - Measurement of Room Acoustic Parameters

ISO 354: 2003 Acoustics & mdash - Measurement of Sound Absorption in a Reverberation Room
ISO 9705-1: 2016 Test Method for a Small Room Configuration
ISO 13784-1: 2014 Small Room Test
ISO 18233: 2006 Acoustics & mdash - Application of New Measurement Methods in Building and Room Acoustics

SUBMISSION

• Construction drawings indicating how all performance objectives have been achieved along with list of Acceptable Solutions

F2 Air Quality, Ventilation and Temperature

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ TOGETHER WITH SECTION H CLIMATE CHANGE ADAPTATION

.1 BUILDINGS and FACILITIES must be constructed to provide adequately controlled interior temperatures at a level appropriate to occupancy and use.

.2 HABITABLE spaces within BUILDINGS must be provided with air that contains sufficient oxygen and limits contaminants to levels consistent with good health, safety and comfort.

.3 Air conditioning of interior spaces must provide sufficient air movement and adequate temperature to create a comfortable living environment appropriate to the number of occupants.

DEEMED-TO-SATISFY PROVISIONS

F2.A Indoor Air Quality

.1 BUILDINGS AND FACILITIES must have a means of collecting and/or removing the following from the rooms in which they are generated:

(a) cooking fumes and odors

(b) excessive water vapor from laundering, utensil washing, bathing and showering

(c) odours from sanitary and waste storage spaces

(d) gaseous byproducts and excessive moisture from **Commercial** or **Industrial** processes

(e) poisonous fumes and gases

(f) air-borne particles

(g) products of combustion

.2 Contaminated air must be disposed of in a way that avoids creating a nuisance or HAZARD to people and other property.

F2.B Room Temperature

.1 Achieving a comfortable indoor temperature may be achieved through any, some, or all of the following:

(a) INSULATION in walls, ceilings, floors, attic spaces

(b) high performance window GLAZING

(c) natural ventilation

(d) external shading of windows and proper window coverings

(e) high-efficiency fans in living and attic spaces

(f) ENERGY EFFICIENT mechanical air conditioning system

.2 Release of heated air to the outside must be provided by the use of any, some or all of the following natural ventilation techniques, unless the BUILDING or FACILITY is fully air-conditioned by a mechanical system:

(a) high ceilings (greater than 2.2 m)

(b) windows/vents within 250 mm of the ceiling

F2.C Ventilation

.1 Ventilation systems in non-residential BUILDINGS must be equipped with:

(a) exhaust outlets and PLUMBING vents a minimum of 6.0 m away from outdoor air intakes

(b) outdoor air intakes located at least 9.0 m away from sources of pollution including dumpsters, parking areas, driveways, loading docks, natural gas lines, wet cooling towers and garage doors / exhaust outlets

(c) outdoor air intakes must be protected with 6.4 mm or smaller mesh screens and filters

(d) roof drainage that slopes away from outdoor air intakes

and must:

(e) account for the demands of any fixed combustion appliances

(f) be sized and configured to accommodate future expansion of the BUILDING or FACILITY

.2 Natural ventilation must consist of permanent openings, windows, doors or other devices which can be opened and are of sufficient size and appropriately placed to provide effective air circulation.

.3 Openings must be placed on all façades, where appropriate to the function and use of the rooms, BUILDING and/or FACILITY, and must be must be screened to prevent entry of birds, rodents, leaves, and other similar objects.

.4 Larger openings must be placed on the downwind, or leeward, facade, and smaller openings on the breeze, or windward, facade to promote air circulation within the BUILDING.

.5 Non air-conditioned BUILDINGS and FACILITIES must have the majority of windows consist of louvred panels or other openable panels to promote air flow, as appropriate to occupancy and use.

.6 Enclosed attic spaces and cathedral ceilings must have adequate ventilation that:

(a) provides adequate cross-ventilation of enclosed attic spaces and enclosed cathedral ceilings

(b) provides exhaust fans: where needed

F2.D Air Conditioning

.1 A mechanical air-handling system installed in a BUILDING must control:

(a) the circulation of objectionable odours

(b) the accumulation of harmful contamination by micro-organisms and pathogens

(c) be in accordance with AS 1668.2 and AS/NZS 3666.1

.2 Air conditioning units must have an appropriate energy-savings certificate from a recognised agency, such as Energy Star.

.3 Ducts must be appropriately sized for room-to-room cooling requirements and to maximise efficiency, with the layout designed to reduce duct length as much as possible.

.4 Ducts must be properly sealed with low VOC (volatile organic compound) mastic so that ductwork is AIRTIGHT, duct tape is not permitted.

.5 Rooms must have adequate sized return ducts or doors that are undercut sufficiently to allow air flow to avoid any situation of negative pressure.

.6 Effective delivery of clean supply air must be sufficiently provided to reduce the impact of pollutants generated in the interior spaces.

.7 Mechanical air conditioning systems must have any or all of the following energy-saving equipment to control the volume of cooled air produced daily and promote ENERGY EFFICIENCY:

(a) variable speed controls

(b) timer-switches for rooms to control air temperature according to time of day and use of the BUILDING or FACILITY

(c) demand-controlled ventilation that adjusts outdoor air intake to maintain optimal indoor air quality

(d) isolate fan motors from supply air streams

.8 Mechanical air handling equipment must have:

(a) air filters with a Minimum Efficiency Reporting Value (MERV) of 13 (or equivalent), or

(b) higher, or terminal equipment with the highest filtration level available for the specific device

.9 All air conditioning systems for BUILDING GROUPS 1-3 must undergo a COMMISSIONING process to ensure the functional and environmental performance is achieved according to:

(a) ASHRAE Guideline 1-1996 - The HVAC Commissioning Process, or

(b) ASHRAE Handbook New Building Commissioning, or

(c) ASHRAE Guideline 0-2005, The Commissioning Process, www.ashrae.org, or

(d) CIBSE Commissioning Code M: Commissioning Management

ACCEPTABLE SOLUTIONS

AIRAH (Australian Institute of Refrigeration Air conditioning and Heating) Technical Handbook www.airah.org.au

AIRAH Technical Manuals

- DA01: 2013 Centrifugal Pumps
- Da02: 1995 Noise Control
- DA03: 1987 Duct Design
- DA09: 1998 Load Estimation & Psychometrics (Air Conditioning)
- DA13: 2013 Fans
- DA15: 1998 Air Filters
- DA16: 1994 Water Piping
- DA17: 1997 Cooling Towers
- DA20: 2016 Humid Tropical Air Conditioning
- DA24: 2003 Water Balancing Systems - Commissioning for Air Conditioning
- DA26: 2004 Indoor Air Quality
- DA29: 2011 Evaporative Air Cooling Systems

AS 4254: 2002 Ductwork for Air-Handling Systems in Buildings

- Part 1: 2012 Flexible Duct
- Part 2: 2012 Rigid Duct

AS/NZS 1668: 2015 The Use of Ventilation and Air Conditions in Buildings

AS/NZS 3580.9.6: 2015 Methods for Sampling and Analysis of Ambient Air -Method 9.6

AS/NZS 3666: 2011 Air-handling and Water Systems of Buildings – Microbial Control

- Part 1: 2011 Design, Installation and Commissioning
- Part 2: 2011 Operation and Maintenance
- Part 3: 2000 Performance-Based Maintenance of Cooling Water Systems

AS/NZS 4740: 2000 Natural Ventilators - Classification and Performance

AS/NZS 4776: 2009 Liquid-Chilling Packages Using the Vapour Compression Cycle 2009

ASHRAE Guideline 1-1996 The HVAC Commissioning Process, www.ashrae.org/publications/page/683

ASHRAE Guideline 0-2005 The Commissioning Process, www.ashrae.org

ASHRAE Handbook New Building Commissioning

ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning

BS EN 15243: 2007 Ventilation for Buildings - Calculation of Room Temperatures and of Load and Energy For Buildings with Room Conditioning Systems

CIBSE (Chartered Institution of Building Services Engineers, U.K.), www.cibse.org

ISO 7730: 2005 Ergonomics of the Thermal Environment:

ISO 29042-8: 2011 Room Method for the Measurement of the Pollutant Concentration Parameter

NZS 4303: 1990 Ventilation for Acceptable Indoor Air Quality

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of Acceptable Solutions
- Construction details for air conditioning systems including all air handling equipment, ductwork, fans, vents and distribution calculations

F3 Wet Area Health and Safety

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ TOGETHER WITH THE HEALTH ORDINANCE, 1959

.1 WET AREAS in BUILDINGS, FACILITIES or SITES must be constructed to safeguard people from injury and illness resulting from water accumulation..

.2 Water intended for human consumption, food preparation, utensil washing, or oral hygiene must be POTABLE WATER.

.3 BUILDINGS, FACILITIES AND SITES must be constructed to avoid the likelihood of:

(a) fungal growths (mould) or the accumulation of contaminants on linings, BUILDING ELEMENTS and BUILDING MATERIALS

(b) damage to BUILDING ELEMENTS and DURABILITY being caused by the use of water

.4 Surfaces of walls, ceilings, floors and permanent furnishings likely to be splashed or to become contaminated in the course of the intended use of the BUILDING must be IMPERVIOUS to water and easily cleaned, and accidental overflow from any water source must be constrained from penetrating another occupancy in the same BUILDING.

.5 Every SITE, HABITABLE BUILDING and HABITABLE FACILITY, except **Storage, Minor and Temporary Buildings**, **Carparks**, and **Regulated Fales,** must provide a sufficient number of SANITARY COMPARTMENTS for personal hygiene based on:

(a) BUILDING use

(b) occupancy - number, gender and particular needs

.6 SANITARY COMPARTMENTS must be designed to reduce potential harm from:

(a) unsafe, slippery floors

(b) scalding hot water

(c) spread of disease

.7 SANITARY COMPARTMENTS in non-residential, publicly ACCESSIBLE BUILDINGS must have sufficient space and configuration, or other means to permit an unconscious occupant to be removed.

DEEMED-TO-SATISFY PROVISIONS

F3.A Wet Area Protection

.1 Overflow from a WET AREA must be prevented from entering:

(a) another room in a STOREY below

(b) another SOLE-OCCUPANCY UNIT used for sleeping accommodation

(c) a public space in the BUILDING, FACILITY or SITE that is not intended to be wet

.2 Water in WET AREAS must not compromise the DURABILITY of the BUILDING, FACILITY or SITE by penetrating behind fittings and linings and/or into concealed spaces.

.3 WET AREAS must be protected from water damage according to the provisions in Table F3.A.3:

Table F3.A.3: Wet Area Protection

Wet Area	Floors	Walls	Penetrations/ Junctions/Joints	Ceilings
Shower	WATERPROOF, sloped with FLOOR DRAIN	WATERPROOF (minimum 1.8 m above FINISHED FLOOR)	WATERPROOF	Mechanical vent if no window in the wall of BATHROOM
BATHROOM sink, vanity, and storage areas	WATERPROOF, or WATER-RESISTANT with FLOOR DRAIN	150 mm WATER-RESISTANT splash zone above sink or water source adjacent to wall	WATERPROOF PLUMBING fixtures, water-resistant for others	Mechanical vent required if there is no window in wall
SANITARY COMPARTMENT (single or multiple TOILETS, urinals, bidets)	WATERPROOF, sloped with FLOOR DRAIN	In public SANITARY COMPARTMENTS, walls must be WATERPROOF behind and at the sides of the fixture from the floor to 300 mm minimum above fixture	WATERPROOf	Mechanical vent required if there is no window in wall
Bath Tubs and Spas	WATERPROOF, sloped with FLOOR DRAIN	150 mm WATER-RESISTANT splash zone above tub or spa adjacent to wall	WATERPROOF	Mechanical vent required if there is no window in wall
Laundries	WATERPROOF, or WATER-RESISTANT with FLOOR DRAIN	150 mm WATER-RESISTANT splash zone above sink or water source adjacent to wall	WATERPROOF PLUMBING fixtures, water-resistant for others	Mechanical vent required if there is no window in wall
Kitchens	WATER-RESISTANT	150 mm WATER-RESISTANT splash zone above sink or water source adjacent to wall	WATERPROOF PLUMBING fixtures, water-resistant for others	Mechanical vent required over stove that outlets to the outdoors

.4 In addition to Table F3.A.3 above, SANITARY COMPARTMENTS in BUILDINGS and FACILITIES must not permit water penetration:

(a) for urinals, by WATERPROOF walls a minimum of 1.2 m above the FLOOR DRAIN and not less than 225 mm on each side of the urinal

(b) for multiple TOILET stalls, by WATERPROOF INTERIOR WALLS

(c) for wall and floor penetrations, by WATERPROOF sealants

.5 Where a slab or stall type urinal is installed, the floor surface of the room containing the urinal must:

(a) be an IMPERVIOUS material

(b) be graded to a FLOOR DRAIN so that there is no standing water

F3.B Mould Prevention

.1 Cross-ventilation through the BUILDING interior must be provided through appropriate layout of rooms, and placement and size of doors, windows and vents.

.2 BUILDINGS and FACILITIES with air conditioning must have positive air pressure to promote proper air circulation.

.3 Methods for prevention of water accumulation listed in Table F3.A.3 above must be followed.

.4 Stand-alone SANITARY COMPARTMENTS not connected to a BATHROOM, laundry or other sanitary room must provide ventilation through either:

(a) a window

(b) mechanical ventilation (see Section F2)

F3.C Number of Sanitary Compartments Required Per Building Function

.1 At least one SANITARY COMPARTMENT with a TOILET must be provided:

(a) for **Single Unit Residential Buildings** and UNITS in a **Multiple Unit Residential Building**

(b) per over-night accommodation room in a **Health-Care** or **Aged-Care Building**

(c) for all other SITES and BUILDINGS except:
- (i) **Storage, Temporary**, and mobile BUILDINGS
- (ii) **Retail, Industrial, Commercial** and **Assembly Buildings** or UNITS that have a GROSS FLOOR AREA of less than 50 m^2, except restaurants, cafés and bars
- (iii) waste disposal site and/or **Major Infrastructure** with no occupied structures or full-time employees
- (iv) **Minor Structures**
- (v) **Carpark** less than 4 STOREYS

.2 SANITARY COMPARTMENTS for **Assembly, Commercial** (excluding **Retail**), **Schools, Stadiums**, restaurants, cafés, bars and tourist gathering places (museums, information BUILDINGS, etc.) must provide separate male and female SANITARY COMPARTMENTS appropriate in number to occupancy and scale.

.3 Where SANITARY COMPARTMENTS are provided for a **Retail** or **Industrial** BUILDING with a GROSS FLOOR AREA less than 50 m^2, it may be a unisex facility.

.4 **Multiple Unit Buildings** with **Retail**, **Industrial** and/or **Commercial** UNITS that do not have a SANITARY COMPARTMENT must provide one SANITARY COMPARTMENT with a TOILET accommodating all genders and abilities for use by employees for every 6 UNITS in the BUILDING.

.5 In addition to requirements for **Retail Buildings**, early childhood BUILDINGS or UNITS must have the following sanitation facilities:

(a) provide one SANITARY COMPARTMENT with a flushable TOILET for every 15 children for all genders and abilities

(b) SANITARY COMPARTMENTS for children must be ACCESSIBLE from indoor and outdoor play areas, and have:

(i) junior pans

(ii) washbasins with a rim height not exceeding 600 mm

.6 In addition to Sections F4.B.1 to F4.B.5 above, a SANITARY COMPARTMENT with a TOILET, urinal, and wash basin, appropriate to the occupants' needs, must be provided as indicated in Table F3.C.6 below:

Table F3.C.6: Sanitary Compartments Required per Building Function

Restaurants, Cafés and Bars
Single Assembly Buildings, Public Halls, Theatres, Cinemas

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
1 - 25	1	1	1	1	1
26-50	1	1	1	2	2
51-100	1	2	2	3	add 1 per 200
101-150	2	3	2	4	
151-200	2	4	2	5	
201-250	2	5	add 1 per 200	6	
250 +	add 1 per 200	add 1 per 100		add 1 per 100	

School Buildings

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
STUDENTS					
1-10	1	1	1	1	1
11-25	1	1	2	2	2
26-50	2	2	2	3	2
51-75	2	3	3	4	3
76-100	3	3	3	5	3
101-125	3	4	add 1 per 75	6	add 1 per 75
126-150	3	4		6	
151-200	4	4		7	
>200	add 1 per 100	add 1 per 100		add 1 per 50	
STAFF					
1-5	1	1	1	1	1
6-20	1	1	1	2	1
21-45	2	2	2	3	2
>45	add 1 per 20	add 1 per 30	add 1 per 30	add 1 per 15	add 1 per 30

Industrial Buildings and Stand-Alone Carparks

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
STAFF					
1-15	1	1	1	1	1
16-30	2	2	1	2	1
31-45	3	2	2	3	2
46-60	3	3	2	4	2
>60	add 1 per 20	add 1 per 50	add 1 per 20	add 1 per 15	add 1 per 20

Office, Retail, Health + Aged Care (with no over-night accommodation), Communal Residential

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
STAFF / OCCUPANTS IN A COMMUNAL RESIDENTIAL BUILDING					
1-15	1	1	1	1	1
16-30	2	2	1	2	1
31-45	3	2	2	3	2
46-60	3	3	2	4	2
>60	add 1 per 20	add 1 per 50	add 1 per 30	add 1 per 15	add 1 per 30

Church

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
1-150	1	1	1	1	1
151-300	1	2	add 1 per 250	2	add 1 per 250
>300	add 1 per 500	add 1 per 200		add 1 per 150	

Assembly Buildings, Theatres and Cinemas with Multiple Venues in the Same Building

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
SPECTATORS					
1-10	1	1	1	1	1
11-50	1	1	1	2	1
51-100	1	1	1	3	2
101-150	1	2	1	4	2
151-200	1	2	add 1 per 150	5	2
201-250	1	2		6	2
>251	add 1 per 500	add 1 per 100		add 1 per 60	add 1 per 200
STAFF / PARTICIPANTS					
1-10	1	1	1	1	1
11-20	1	2	2	2	2
>20	add 1 per 20	add 1 per 10	add 1 per 10	add 1 per 10	add 1 per 10

Sports Venues / Stadiums

Occupancy	Male			Female	
	Toilet	Urinal	Wash Basin	Toilet	Wash Basin
SPECTATORS					
1-15	1	1	1	1	1
16-50	1	1	1	2	1
51-100	1	1	1	3	2
101-150	1	2	1	4	2
151-200	1	2	add 1 per 150	5	2
201-250	2	3		6	add 1 per 150
>250	add 1 per 500	add 1 per 100		add 1 per 70	
PLAYERS / PARTICIPANTS					
1-10	1	1	1	1	1
11-20	1	2	2	2	2
>20	add 1 per 20	add 1 per 10	add 1 per 10	add 1 per 10	add 1 per 10

.7 ACCESSIBLE TOILETS, urinals, wash basins and other BATHROOM accoutrements must be provided in REQUIRED ACCESSIBLE BUILDINGS in accordance with all provisions in Section D1.C.7 of the NBC

ACCEPTABLE SOLUTIONS

AS 1308: 1987 Electric Water Heaters - Thermostats and Thermal Cut-Outs
AS 1357: 2009 Water Valves for Use with Unvented Water Heaters
AS 1432: 2004 Copper Tubes for Plumbing, Gasfitting and Drainage Applications
AS 3740: 2010 Waterproofing Of Domestic Wet Areas
AS 3588: 1996 Shower Bases and Shower Modules
AS 4858: 2004 Wet Area Membranes

AS/NZS 1477: 2006 PVC Pipes and Fittings for Pressure Applications
AS/NZS 1646: 2007 Elastomeric Seals for Waterworks Purposes
AS/NZS 1730: 1996 Washbasins
AS/NZS 2023: 1995 Baths for Ablutionary Purposes
AS/NZS 2032: 2006 Installation of PVC Pipe Systems
AS/NZS 2033: 2008 Installation of Polyethylene Pipe Systems
AS/NZS 2280: 2012 Ductile Iron Pipes and Fittings
AS/NZS 2712: 2007 Solar and Heat Pump Water Heaters - Design and Construction

AS/NZS 2642: Polybutylene Pipe Systems
Part 1: 2007 Polybutylene (PB) Pipe Extrusion Compounds
Part 2: 2008 Polybutylene (PB) Pipe for Hot and Cold Water
Part 3: 2008 Mechanical Jointing Fittings For Use With Polybutylene (PB) Pipes For Hot and Cold Water Applications
AS/NZS 4692: 2002 Electric Water Heaters
AS/NZS 4765: 2007 modified Polyvinyl Chloride (PVC-M) Pipes for Pressure Applications
AS/NZS 4858: 2004 Wet Area Membranes
AS/NZS 4936: 2002 Air Admittance Valves For Use In Sanitary Plumbing And Drainage Systems

New Zealand Ministry of Health: 2006 Household Water Supplies: The Selection Operation and Maintenance of Individual Household Water Supplies

NZS 4602: 1988 Low Pressure Copper Thermal Storage Electric Water Heaters
NZS 4603: 1985 Installation of Low Pressure Thermal Storage Electric Water Heaters with Copper Cylinders (open vented systems)
NZS 4606: 1989 Storage Water Heaters
Part 1: 1989 General Requirements
Part 2: 1989 Specific Requirements for Water Heaters with Single Shells
Part 3: 1992 Specific Requirements for Water Heaters with Composite Shells
NZS 4607: 1989 Installation of Thermal Storage Electric Water Heaters: Valve Vented Systems
NZS 4608: 1992 Control Valves for Hot Water Systems
NZS 4613: 1986 Domestic Solar Water Heaters
NZS 4614: 1986 Installation of Domestic Solar Water Heating Systems
NZS 4617: 1989 Tempering (3-port mixing) Valves
NZS 6214: 1988 Thermostats and Thermal Cutouts for Domestic Thermal Storage Electric Water Heaters (alternating current only)
NZS 7601: 1978 Specification for Polyethylene Pipe (Type 3) for Cold Water Services
NZS 7602: 1977 Specification for Polyethylene Pipe (Type 5) for Cold Water Services
NZS 7610: 1991 Ble Polyethylene Pipes up to Nominal Size 63 for Below Ground Use for Potable Water

SUBMISSION

- Construction dr4608awings indicating how all performance objectives have been achieved along with a list of Acceptable Solutions

- Construction drawings, specifications and/or product sheets for all PLUMBING and SANITARY FIXTURES, supply lines and disposal mechanisms

F4 Lighting

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ TOGETHER WITH THE HEALTH ORDINANCE, 1959

.1 HABITABLE spaces must provide adequate openings for natural light and for a visual awareness of the outside environment.

.2 Sufficient openings must be provided and distributed in a BUILDING so that natural light, when available, provides a level of illumination appropriate to the function or use of that part of the BUILDING.

.3 Lighting for all BUILDINGS and FACILITIES must be 100% ENERGY EFFICIENT as appropriate to the occupancy, scale and use.

.4 Sufficient lighting must be provided to allow safe use of the BUILDING, FACILITY or SITE and safe movement by people and EMERGENCY RESPONDERS.

.5 Emergency lighting must be provided for all BUILDINGS and FACILITIES required to do so, as specified in:

(a) Section C7.F Emergency Lighting and Exit Signs

(b) Section E3.A.2 Hazardous Substances Management Plan

DEEMED-TO-SATISFY PROVISIONS

F4.A Lighting Controls

.1 The following ENERGY EFFICIENT lighting controls must be installed in all non-residential BUILDINGS and FACILITIES in BUILDING GROUP 1-4 (except **Minor** and **Temporary Structures**) and all public areas of **Multiple Unit Residential Buildings** as appropriate to the occupancy and use:

(a) interior AUTOMATIC light shut-off controls

(b) time-scheduling switches

(c) occupancy-sensing devices

(d) light-reduction controls (AUTOMATIC or manual)

(e) individual switches for each luminaire or logical grouping of luminaires in open-style BUILDINGS greater than 350 m

(f) motion-sensor lighting for exterior lighting other than the main entry or other entry deemed necessary to be illuminated at night due to security reasons

F4.B Natural Lighting

.1 Natural lighting must demonstrate ADF (Average Daylight Factor) of no less than 1.5% for living areas and BATHROOMS, or windows in EXTERNAL WALLS must be no less than 20% of GROSS FLOOR AREA for living areas and bedrooms.

.2 Direct natural lighting must be provided by windows that face:

(a) a court or other space open to the sky

(b) an open verandah, open carport, or the like

.3 Natural lighting to a room in a **Residential Building**, or in a **Single Occupancy Unit** of a **Multiple Unit Residential Building** may come through a glazed panel or opening from an adjoining room (including an enclosed veranda) providing:

(a) both rooms are within the same **Single Occupancy Unit** or the enclosed veranda is on common property

(b) the glazed panel or opening has an area of not less than 10% of the GROSS FLOOR AREA of the room to which it provides light

(c) the adjoining room has windows with an aggregate light transmitting area of not less than 10% of the combined GROSS FLOOR AREA of both rooms

(d) the areas specified in (b) and (c) above may be reduced as appropriate if direct natural light is provided from another source

F4.C Artificial Lighting

.1 HABITABLE spaces and means of egress within BUILDINGS must be provided with adequate artificial lighting to enable safe movement where necessary to supplement natural lighting ,appropriate to the intended use regarding scale, placement and brightness.

.2 Artificial lighting must be provided in all EVACUATION ROUTES, FIRE-ISOLATED PASSAGEWAYS, STAIRWAYS and RAMPS by means of separate electrical WIRING CIRCUITS from the MAIN SWITCHBOARD for the exclusive use of the stairway, ramp or passageway.

.3 If sufficient natural lighting is not available, artificial lighting must be provided:

(a) to SANITARY COMPARTMENTS, BATHROOMS, shower rooms, airlocks and laundries in BUILDINGS and FACILITIES

(b) to all rooms that are frequently occupied and all corridors, lobbies, internal stairways, other circulation spaces and paths of egress in BUILDINGS and FACILITIES other than **Single Unit Residential** and **Fales**

(c) on the EXTERNAL WALL of BUILDING entrances

(d) to illuminate the extent of the site where access and parking need to be illuminated

(e) to limit lighting directed toward neighbouring property

F4.D Renewable Energy Lighting

.1 Solar or wind powered lighting fixtures can be used for any external or internal lighting provided they produce sufficient illumination to allow safe use of the SITE during normal operations.

.2 Any solar lighting fixture illuminating an EMERGENCY EXIT must be accompanied by a FIRE-RESISTANT lighting system that will continue to operate for a minimum of 1 hour from the start of the emergency.

ACCEPTABLE SOLUTIONS

AS/NZS 1158.6: 2006 Lighting for Roads and Public Spaces
AS/NZS 1680: 2009 Interior and Workplace Lighting
AS/NZS 2293: 2005 Emergency Evacuation Lighting for Buildings
AS/NZS 2535.1: 2007 Test Methods for Solar Collectors - Thermal Performance of Glazed Liquid Heating Collectors Including Pressure Drop
AS/NZS 4782: 2006 Double-Capped Fluorescent Lamps Series
AS/NZS 4783: 2001 Performance of Electrical Lighting Equipment
AS/NZS 4847: 2010 Selfballasted Lamps for General Lighting Services Series
AS/NZS 4879: 2010 Performance of Transformers and Electronic Step-Down Convertors for ELV Lamps Series
AS/NZS 4934 .1: 2014 Incandescent Lamps for General Lighting Service - Part 1: Test Methods - Energy Performance
AS/NZS 60432.1 and .2: 2007 Incandescent Lamps - Safety Specifications
AS/NZS 60598: 2001 Luminaires
AS/NZS 60598.2.20: 2002 Luminaires - Particular Requirements - Lighting chains
AS/NZS 61231: 2001 International Lamp Coding System (ILCOS)
AS/NZS 61347.1: 2002 Lamp Control-Gear - General and Safety Requirements
AS/NZS IEC 62560: 2014 Self-Ballasted LED-Lamps for General Lighting Services by Voltage Greater Than 50V

BS EN 13363-1: 2003 + A1: 2007 Solar Protection Devices Combined with Glazing - Calculation of Solar and Light Transmittance Simplified Method

N 62384: 2006 DC or AC Supplied Electronic Control Gear for LED Modules - Performance Requirements

NZS 4243.2: 2007 Energy Efficiency - Large Buildings - Lighting
NZS 6703: 1984 Code of Practice for Interior Lighting Design

Non-Electrical Lighting
AS 4509: 2009 Stand-Alone Power Systems
Part 1: Safety Requirements
Part 2: Design Guidelines
Part 3: Installation and Maintenance

AS/NZS 5033: 2014 Installation and Safety Requirements for Photovoltaic (PV) Arrays

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of Acceptable Solutions
- Details of lighting fixtures, energy requirements, energy-efficient bulbs, etc.

F5 Finishes on Walls, Ceilings and Floors

REQUIRED PERFORMANCE

.1 Interior finishes on walls, ceilings and floors must not be harmful to the health of people or the environment.

.2 Along with FRL (FIRE RESISTANCE LEVEL) requirements for the construction of walls, ceilings and floors in Section C5.D, interior finishes on walls, ceilings and floors must not compromise the DURABILITY of the BUILDING ELEMENT or ASSEMBLY to which it is applied.

.3 Interior finishes on walls, ceilings and floors must have an acceptable environmental performance acceptable to the Government of Samoa

DEEMED-TO-SATISFY PROVISIONS

F5.A Non-Corrosive Steel Finishes

.1 Structural steel members that are not built into a masonry wall must be protected against corrosion with an acceptable coating or finish in accordance with Table F5.A.1 below:

Table F5.A.1 Minimal Finishes for Exposed Steel

Environment	Location	Minimum Protective Coating General Structural Steel Members
More than 1 km away from the coastline	INTERNAL	No protection required in a permanently dry location
	EXTERNAL	2 coats alkyd primer, or 2 coats alkyd gloss, or Hot dipped galvanised 300 g/m^2 min.,or Hot dipped galvanised 100 g/m^2 min. plus (i) 1 coat solvent based vinyl primer, or (ii) 1 coat vinyl floss or alkyd
Within 1 km of the coastline	INTERNAL	2 coats alkyd primer, or 2 coats alkyd gloss
	EXTERNAL	Inorganic zinc primer plus 2 coats vinyl gloss Hot dipped galvanised 300 g/m^2 Hot dipped galvanised 100 g/m^2 min. plus (i) 2 coats solvent based vinyl primer, or (ii) 1 coats vinyl floss or alkyd

.2 Where a paint finish is applied, the surface of the steel work must be hand or power tool cleaned to remove any rust immediately prior to painting.

.3 All zinc coatings (including inorganic zinc) require a barrier coat to stop conventional domestic enamels from peeling.

.4 Where decorative finishes are required on top of the minimum coating specified in Table F5.A.1, the paint manufacturer's instructions must be executed.

.5 Internal locations subject to moisture, such as in close proximity to kitchen or BATHROOM exhaust fans, are not considered to be in a permanently dry location as indicated in Table F5.A.1.

.6 For applications outside the scope of Table F5.A.1, specialist advice must be sought.

F5.B Environmental Performance of Interior Finishes

.1 Interior finishes applied to the interior surface of walls, ceilings and floors, including adhesives and sealants, applied coatings, paint, carpets and textiles, wood and engineered wood, wallpaper, etc., must have an environmental performance acceptable to the Government of Samoa.

.2 At least 50% of interior finishes (appliance coatings, adhesives and sealants, floor coverings, and engineered wood) must meet volatile organic compound (VOC) limits to reduce detrimental impacts on human health.

.3 Fabric finishes such as carpets, drapes, fabric covered furniture or walls must be minimised or not used to promote ENERGY EFFICIENCY and reduction of humidity.

.4 Interior finishes must have a Recognised Eco-label as listed in Table F5.B.4, or an approved equivalent, that does not compromise the health and safety of occupants at a similar level of performance.

Table F5.B.4: Recognised Eco-labels for Interior Finishes

Recognised Eco-labels as per NZGBC New Zealand Green Building	Adhesives & Sealants	Applied Coatings	Ceiling Covering	Concrete	Engineered Wood	Floor Covering	Insulation	Wall Coverings	Steel	Wood / Timber
ECNZ Environmental Choice New Zealand		●	●	●	●	●	●	●	●	
GreenTag GreenRate	●	●	●		●	●	●	●		
GECA Good Environmental Choice Australia		●			●	●		●		
MTS Institute for Market Transformation to Sustainability										
SMaRT Sustainable Materials Rating Technology					●	●				
ECS Carpet Institute of Australia Environmental Certification						●				
GuT						●				
AgBB					●	●				
UL Greenguard	●	●	●		●	●		●		
CRI Carpet and Run Institute Green Label Plus			●			●		●		
SCS Indoor Advantage Gold			●		●	●				
RFCI Resilient Floor Covering Institute FloorScore						●				
Formaldehyde E0 or E1 compliance					●					
EMICODE	●									
Blue Angel	●	●	●		●	●		●		
FSC Forest Stewardship Council										●

+All updates to the list of Recognised Eco-labels as periodically made by the New Zealand Green Building Council are applicable.

ACCEPTABLE SOLUTIONS

AS 1684: 2010 Residential Timber-Framed Construction - Tongued, Grooved, Plywood and Particleboard Flooring
AS 1860.1: 2002 Particleboard Flooring - Specifications
AS 1884: 2012 Floor Coverings - Resilient Sheet and Tiles - Laying and Maintenance Practices
AS 2404: 1980 Textile Floor Coverings - Fire Propagation of the Use-Surface Using a Small Ignition Source
AS 2454: 2007 Textile Floor Coverings - Terminology
AS 2796.2: 2006 Timber -Hardwood - Sawn and Milled Products - Grade Description
AS 3958.1: 2007 Ceramic Tiles - Guide to the Installation of Ceramic Tiles
AS 4288: 2003 Soft Underlays for Textile Floor Coverings
AS 4459: 1992 Methods of Sampling and Testing Ceramic Tiles Series
AS 4662: 2003 Ceramic Tiles - Definitions Classification, Characteristics and Marking
AS 4785.2: 2002 Timber - Softwood - Sawn and Milled Products - Grade Description
AS 4786.2: 2005 Timber Flooring - Sanding and Finishing
AS 4992: 2006 Ceramic Tiles - Grouts and Adhesives Series

AS/NZS 1385: 2007 Textile Floor Coverings - Metric Units and Commercial Tolerances for Measurement
AS/NZS 1580.455.1: 1977 Methods of Test for Paints and Related Materials-Resistance to Water at Room Temperature
AS/NZS 2111: 1996 Textile Floor Coverings - Tests and Measurements Series
AS/NZS 2119: 1997 Textiles for Floor Coverings-Machine-Made-Sampling / Cutting Specimens for Physical Tests
ASNZS 2455: 2007 Textile Floor Coverings
AS/NZS 2914: 2007 Textile Floor Coverings - Informative Labelling
AS/NZS 3733: 1995 Textile Floor Coverings - Cleaning Maintenance of Residential and Commercial Carpeting

BS 5385.1: 2009 Wall and Floor Tiling- Design and Installation

EN 12057: 2004 Natural Stone Tiles - Modular Tiles - Requirements
EN 12058: 2004 Natural Stone Products - Slabs for Floors and Stairs - Requirements
EN 12059: 2004 Natural Stone Products - Dimensional Stone Work - Requirements

ISO 9223: 1992 Corrosion of Metals and Alloys: Corrosivity of Atmospheres; Classification

Sources for Eco-Labels for Building Materials:

- www.enviro-choice.org.nz
- www.ecospecifier.org
- www.greenbuild.co.nz
- www.geca.org.au Good Environmental Choice Australia

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of Acceptable Solutions
- Chart showing list of interior finishes and the recognised Eco-labels associated with each

F6 Food Preparation and Refrigeration

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ TOGETHER WITH THE FOLLOWING DOCUMENTS, AS AMENDED:
- **HEALTH ORDINANCE , 1959**
- **FOOD (SAFETY AND QUALITY) REGULATIONS, 2016**

.1 BUILDINGS and FACILITIES used for food preparation, food processing and refrigeration must be designed, constructed and operated to:

(a) safeguard people from contamination and transmittance of water-borne diseases

(b) safeguard people from injury during normal operations

(c) safeguard the SITE and neighbouring properties from contamination or HAZARDOUS SUBSTANCES

(d) maximise FOOD SAFETY

.2 Design and construction of kitchens and food processing areas must permit the premises to be effectively cleaned and, if necessary, sanitised and:

(a) discourage accumulation of dirt, dust, fumes, smoke and other contaminants

(b) not permit the entry of pests

(c) not provide harbourage for pests

.3 Refrigeration equipment in all BUILDINGS and FACILITIES must:

(a) be ENERGY EFFICIENT and contain visible energy rating labels demonstrating acceptable performance

(b) allow safe isolation and access for service personnel and replacement of equipment

(c) include devices to monitor and control temperature

(d) have appropriate safeguards when utilising toxic or flammable refrigeration agents

.4 BUILDINGS and FACILITIES used for commercial food preparation and food processing must be designed and constructed with the following features:

(a) access to adequate SANITARY COMPARTMENTS for personal hygiene

(b) adequate supply of POTABLE WATER where water or ice is required for food business operations

(c) adequate space and facilities for the hygienic storage, preparation and cooking of food appropriate to the use of the BUILDING.

(d) adequate facilities to hygienically store and dispose of food waste

(e) facilities to adequately ensure proper temperature control of food, where required

(f) food equipment that safeguards maintenance personnel and occupants from injury

(g) adequate facilities to clean food, utensils and equipment

F6.A Kitchen Safety and Hygiene

.1 Food preparation facilities must include:

(a) space for a refrigerator, or a perishable food storage area capable of being cooled and protected from vermin and insects

(b) means for food rinsing, utensil washing and waste water disposal

(c) means for cooking food

(d) sufficient space and a working surface for food preparation made of smooth, IMPERVIOUS material that can be easily cleaned, maintained and disinfected

(e) means for temporary storage of food waste and recyclable material

(f) protection from water damage as per Table F3.A.3 above

(g) POTABLE water supply as per Section G3.B

.2 In addition to the requirements in Section F6.A.1 above, commercial kitchens must be designed and constructed according to standards of the Ministry of Health and include:

(a) adequate air movement through natural or mechanical ventilation to effectively remove fumes, smoke, steam and vapours from the food premises

(b) refrigerators that maintain a temperature of 5° C (40° F) so that food won't spoil

(c) enclosed garbage or recyclable bins, or other means of keeping pests and animals away

(d) fixtures and fittings and equipment designed, constructed, located and installed so that:
- (i) there is no likelihood that they will cause food contamination
- (ii) they are able to be easily and effectively cleaned
- (iii) adjacent floors, walls, ceilings and other surfaces are able to be easily and effectively cleaned
- (iv) they are unable to absorb grease, food particles and water if there is a likelihood of causing food contamination
- (v) they are made of material that will not contaminate food

(e) hand washing facilities that are:
- (i) easily accessed by food handlers
- (ii) permanent
- (iii) connected to or provided with a supply of warm running potable water
- (iv) clearly designated for the sole purpose of washing hands, arms and face

(f) hot boxes and ovens capable of holding food at 60° C or above (hot hold)

(g) surfaces of walls, partitions, and floors made of IMPERVIOUS, non-hazardous materials

(h) walls and partitions with a smooth surface up to a height appropriate to the operation

(i) floors with adequate drainage and cleaning

(j) windows, where provided, must be easy to clean, constructed to minimise build-up of dirt, and fitted

with removable and cleanable inspect-proof screens

(k) doors with smooth, non-absorbent surfaces that are easy to clean

.3 Adequate SETBACKS from swinging doors at kitchen entrances must be provided to allow for safe passage to adjacent doorways, halls, closets, food storage or other activity.

.4 Temporary kitchens (including food trucks containing a kitchen) must have:

(a) space for a refrigerator, or a perishable food storage area capable of being cooled and protected from vermin and insects

(b) means for washing and waste water disposal

(c) means for cooking / heating food

(d) space and a surface for food preparation made of IMPERVIOUS materials that can be easily cleaned

(e) means for temporary storage of food waste and recyclable material

.5 Movable food carts (including food trucks containing a kitchen) must be able to:

(a) store and serve food at acceptable temperatures to prevent contamination

(b) be constructed of smooth, hygienic surfaces where there is contact with food

(c) have a means for storage of food waste and recyclable material

F6.B Commercial and Industrial Refrigeration Systems

.1 REFRIGERANTS used in commercial kitchens and for commercial or industrial operations must have zero or "near-zero" (less than 0.03) Ozone Depletion Potential (ODP) for cooling equipment (not including equipment with less than 0.5 kg (1 lb.) of REFRIGERANT – e.g., refrigerators, temporary cooling equipment).

.2 REFRIGERANTS must have a low GLOBAL WARMING POTENTIAL (GWP500 or less).

.3 REFRIGERATION ROOMS used in commercial kitchens and for commercial or industrial operations must be AIRTIGHT and tested prior to being permitted to operate according to GreenChill Best Practices Guideline Ensuring Leak-Tight Installations of Commercial Refrigeration Equipment or other Best Practices acceptable to the Government of Samoa.

.4 REFRIGERATION ROOMS must have leak detectors capable of detecting leakage rates down to 2.0% per year for each REFRIGERANT

.5 An alarm system capable of alerting the BUILDING operators to leakage thresholds must be part of the REFRIGERATION SYSTEM.

.6 Walk-in refrigerators used in commercial kitchens and for commercial or industrial operations must be designed and

constructed according to IRHACE - Institute of Refrigeration, Heating, Air Conditioning Engineers of New Zealand - Code of Practice, 2001, as amended, or an approved equivalent.

.7 A walk-in refrigerated or cooling chamber must:

(a) have a door which is in an opening with a clear width of not less than 600 mm and a clear height of not less than 1.5 m

(b) at all times, be able to be opened from inside without a key

F6.C Ventilation in Food Premises

.1 All kitchens, domestic or commercial, must have adequate means of natural or mechanical ventilation to:

(a) prevent air-borne contamination of food, and contamination of food from condensation

(b) control temperature and humidity to an acceptable level for human comfort and health

(c) control odours

(d) expel air to an appropriate location that will not harm humans, the environment or adjacent properties

.2 Ventilation must expel air outside of the BUILDING or FACILITY.

ACCEPTABLE SOLUTIONS

AIRAH Technical Manual DA21 Amonia Refrigeration

AS 4674: 2004 Design, Construction and Fit-Out of Food Premises
AS 4696: 2007 Hygienic Production and Transportation of Meat and Meat Products for Human Construction
AS 5008: 2007 Hygienic Rendering of Animal Products

AS/NZS 1677.1 and .2: 1998 Refrigerating Systems

AS/NZS ISO 817: 2015 Refrigerants – Designation and Safety Classification
AS/NZS 5149: 2016 Refrigerating Systems and Heat Pumps - Safety and Environmental Requirements, Parts 1 to 4.

AS/NZS 60335.2.24: 2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Refrigerating Appliances, Ice-Cream, Appliances and Ice-Makers

AS/NZS 60335.2.6: 2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Stationary Cooking Ranges, Hobs, Ovens and Similar Appliances

AS/NZS 60335.2.31: 2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Range Hoods

NZS 5262: 2003 Gas Appliance Safety Amend: 1

BRANZ Technical Paper P36: 1983 Food Processing Floors, a Guide to Design, Materials and Construction

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Specifications and/or PRODUCT INFORMATION SHEETS for all food preparation and refrigeration equipment
- Evidence that food preparation and refrigeration equipment meets environmental and performance standards

Section G

Site Servicing + Waste

Contents

Table G1: Section G - Overview of Applicable Sections in the NBC

Section G

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
G1 Piping - Water, Greywater and Waste																
G1.A	Piping Materials	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G1.B	Piping Penetrations in Framing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G2 Wastewater Management																
G2.A	Wastewater System Capacity	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G2.B	Function, Layout and Setbacks	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G2.C	Site and Soil Evaluation Report															
G3 Water Supply																
G3.A	Water Supply Components	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G2.B	Potable Water	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G3.C	Greywater + Non-Potable Water	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G3.D	Water Collection Tanks	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G3.E	Heated and Cold Water Supply	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G3.F	Water Usage and Conservation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4 Electrical Safety																
G4.A	Installer Qualifications	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.B	Electrical System Design	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.C	Shock Prevention	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.D	Voltage	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.E	Circuits	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.F	Switchboards	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.G	Wiring Identification	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.H	Wiring Installation (General)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.J	Wiring Connections	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.K	Above-Ground Wiring Protection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.L	Underground Wiring	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.M	Earthing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.N	Equipotential Bonding	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.O	Wet Areas and Swimming Pools															
G4.P	Lightning Protection System	•	•	•	•				•	•	•	•	•	•		•
G4.Q	Refrigeration Room	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G4.R	Aerial Conductors															
G5 Fuel Supply																
G5.A	Compliance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G5.B	Incinerator Rooms	•	•	•	•				•	•	•	•	•	•		•
G5.C	Fuel Gas Cylinders	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G6 Non-Domestic Liquid and Solid Waste																
G6.A	Solid Waste Storage and Disposal	•	•	•	•				•	•	•	•	•	•	•	•
G6.B	Liquid Waste Storage + Disposal	•	•	•	•				•	•	•	•	•	•	•	•
G6.C	Maintenance Access	•	•	•	•				•	•	•	•	•	•	•	•

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A2 and A3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number and a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

Refer to each section for specific requirements

Section G OBJECTIVES

G(i)
All BUILDINGS and SITES must provide safe, healthy drinking water and human waste disposal appropriate to occupancy and use

G(ii)
The design, construction, alteration, operation, maintenance and demolition of SITE SERVICING for BUILDINGS, FACILITIES, and SITEWORK must:

(a) safeguard people from illness due to infection or contamination resulting from foul water accumulation or its disposal, or contamination from solid or liquid waste

(b) safeguard people from loss of amenity due to the presence of unpleasant odours

(c) protect households and site amenities from damage caused by water entering the SITE or UNIT from another property or UNIT

G(iii)
ELECTRICAL INSTALLATION in a BUILDING, FACILITY or SITE must be designed and installed to safeguard people and property from injury and loss of life, and protect against outbreak of fire, electrical shock and excessive heat

G1 Piping - Water, Greywater and Waste

REQUIRED PERFORMANCE

.1 BUILDINGS with SANITARY COMPARTMENTS and a POTABLE WATER supply must have a PLUMBING system (indoor) and SITE SERVICING (outdoor) to carry WASTEWATER to appropriate DISCHARGE AREAS.

.2 Piping, fasteners and supporting construction in the PLUMBING system and SITE SERVICING must be constructed to:

(a) convey WASTEWATER from within BUILDINGS and FACILITIES to a RETICULATED WASTEWATER SYSTEM or an ON-SITE WASTEWATER MANAGEMENT system

(b) convey GREYWATER (where used) from the supply source to an acceptable use, and/or to a DISCHARGE AREA, DRAINAGE DITCH, STORMWATER MANAGEMENT component, RETICULATED WASTEWATER SYSTEM or an ON-SITE WASTEWATER MANAGEMENT SYSTEM

(c) convey a water supply from a source to an end use

(d) avoid the likelihood of leakage and blockage

(e) avoid the likelihood of foul air and gases entering structures

(f) provide reasonable access for maintenance and clearing blockages

.3 Piping for water, GREYWATER and waste must be constructed to permit effective cleaning and maintenance.

.4 Layout, materials and connections of piping for water, GREYWATER and waste must avoid:

(a) food contamination

(b) accumulation of dirt or bacteria

(c) the likelihood of ingress of SURFACE WATER, GROUNDWATER, and stormwater into the system

.5 Every part of a PLUMBING. WASTEWATER, or air-handling system installation containing piping must be constructed in an appropriate manner, using materials and products that are fit, certified and authorised for the purpose for which they are intended, and are not HAZARDOUS or pose an unacceptable FLAMMABILITY risk.

DEEMED-TO-SATISFY PROVISIONS

G1.A Piping Materials

.1 Materials for PLUMBING and WASTEWATER systems must be appropriate to:

(a) type of usage likely to occur and the nature of the POTABLE WATER, WASTEWATER, or other matter to be conveyed

(b) SITE characteristics and nature of the environment

(c) the possibility of abrasion by solids in the flow, or of chemical attack

(d) range of temperatures in the PLUMBING system, interior and exterior of the BUILDING or FACILITY, and required for any industrial process

.2 Materials which are not certified by a recognised agency may be deemed acceptable if the process for certification and authorisation outlined in Part G1 of the Building Code of Australia, Volume 3, Plumbing Code, is followed and deemed appropriate by the Government of Samoa.

.3 The design, construction, installation, replacement, repair, alteration and maintenance of PLUMBING must be in accordance with:

(a) for **Single Unit Residential** and **Storage Buildings** - AS/NZS 3500.2

(b) for all other BUILDINGS - Section 4 of AS/NZS 3500.5

G1.B Piping Penetrations in Framing

.1 PLUMBING and SITE SERVICING penetrations in steel floor joists must be placed midway through the steel STUD with at least a 25mm distance from the STUD edge, and comply with the following provisions in the NBC :

(a) Section C6 Protection of Service Openings

(b) Section H5 Weathertight Construction

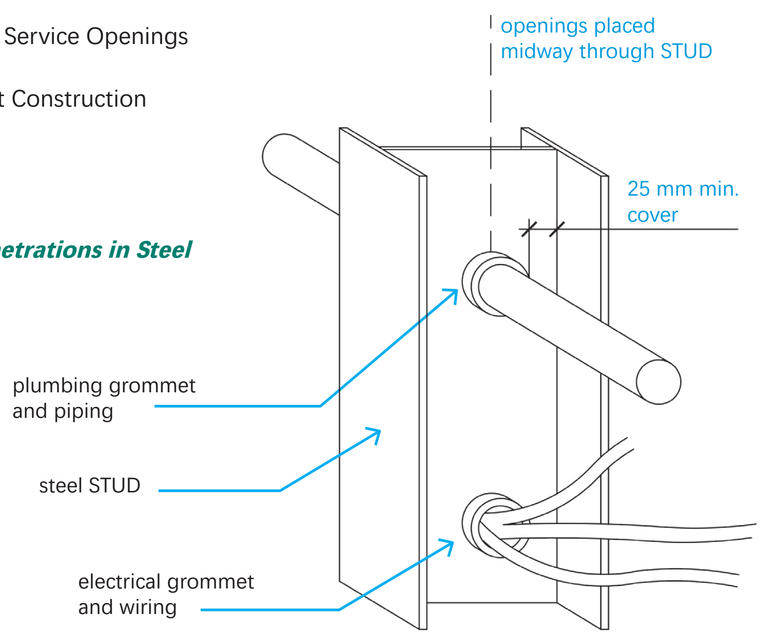


Figure G1.B.1: Piping Penetrations in Steel Framing

.2 In steel-framed construction, PLUMBING and UTILITIES must run through pre-punched holes in steel STUDS, and extra holes, where necessary, must be located near the centre-line of each STUD provided:

(a) the structural capability of the member is not reduced

(b) the hole is not more than 10% larger than the existing holes

(c) the hole is fitted with a non-conductive grommet and sealed so that it resists the spread of fire

.3 In masonry veneer construction, pipe runs may be located in the wall cavity and fixed to STUDS with full pipe saddles and self drilling screws properly protected against galvanic corrosion.

.4 In construction where external CLADDING is attached directly to the steel STUD work, piping must be:

(a) installed over the ceiling, and/or

(b) suspended under the floor, and/or

(c) installed using pre-punched holes according to Section G1.B.2 above

.5 PLUMBING and SITE SERVICING fittings may be attached (see Figure G1.B.5) to timber or wood FRAMING by:

(a) timber or steel noggins fitted between STUDS to support tap sets, baths and sinks

(b) where a steel noggin is used, the tap set must be isolated to prevent corrosion by a DURABLE non-corrosive material such as timber, cement sheet etc

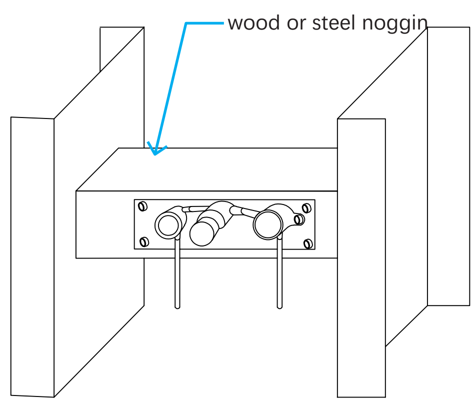


Figure G1.B.5: Attachments for Steel Noggin

.6 Copper and brass pipes and fittings must be prevented from coming into contact with steel FRAMING by one of the following methods:

(a) where PLUMBING or SITE SERVICING pipes pass through holes, plastic grommets must be snapped into the hole

(b) in other areas where copper pipes may come into contact with metal FRAMING, they must be lagged or isolated with neoprene sheeting or tape

ACCEPTABLE SOLUTIONS

AS 1273: 1991 Unplasticised PVC (uPVC) Downpipe and Fittings for Rainwater
AS 1579: 2001 Arc Welded Steel Pipes and Fittings for Water and Waste Water
AS 1589: 2001 Copper and Copper Alloy Waste Fittings
AS 1741: 1991 Vitrified Clay Pipes and Fittings with Flexible Joints
AS 2845: 2010 Water Supply – Mechanical Backflow Prevention Devices
AS 3571: 2009 Plastic Piping Systems – Glass Reinforced Thermoplastics (GRP) Systems Based on Unsaturated Polyester (UP) Resin – Pressure and Non-Pressure Drainage and Sewerage (ISO 10467: 2004 MOD)
AS 3688: 2005 Water Supply – Copper and Copper Alloy Compression and Capillary Fittings and Threaded End Connectors
AS 3690: 2009 Installation of ABS Pipe Systems
AS 3735: 2001 Concrete Structure Retaining Liquids
AS 4139: 2003 Fibre Reinforced Concrete Pipes and Fittings

ANSI/ASME B16.1: 1989 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ANSI/ASME B16.5: 1988 Pipe Flanges and Flanged Fittings, Steel-Nickel Alloy and Other Special Alloys

API SPEC 5L: 1991 Specification for Line Pipe
API STD 1104: 1988 Welding of Pipelines and Related Facilities

AS/NZS 1546.1: 2008 On-Site Domestic Wastewater Management Units
- Part 1: Septic Tanks, Applies in all Other Aspects for Septic Tanks, Greywater Tanks, Holding Tanks, Pump Wells
- Part 2: Waterless Composting Toilets
- Part 3: Aerated Wastewater Management Systems

AS/NZS 1547: 2012 On-Site Domestic Wastewater Management
AS/NZS 2041: 1998 Buried Corrugated Metal Structures
AS/NZS 2179.1: 1994 Specifications for Rainwater Goods, Accessories and Fasteners
AS/NZS 3500:2003 National Plumbing and Drainage Code
- Part 1: 20:13 Water services
- Part 2: 2013 Sanitary Plumbing and Drainage
- Part 4: 2013 Heated Water Services Amends
- Part 5: 2013 Domestic Installation

AS/NZS 3518: 2004 Acrylonitrile Butadiene Styrene (ABS) Compounds Pipes and Fittings for Pressure Applications
AS/NZS 3666: 2011 Air-Handling and Water Systems - Microbial Control, Design, Installation and Commissioning
AS/NZS 3896: 1998 Waters – Examination for Legionellae Including Legionellae pneumophila
AS/NZS 4020: 2005 Testing of Products for Use in Contact with Drinking Water
AS/NZS 4058: 2007 Pre Cast Concrete pipes (pressure and non-pressure)
AS/NZS 4129: 2008 Fillings for Polyethylene (PE) Pipes for Pressure Applications
AS/NZS 4130: 2009 Polyethylene (PE) Pipe for Pressure Applications
AS/NZS 4401: 2006 High Density Polyethylene Fittings for Soil and Waste Discharge Systems Inside Buildings
AS/NZS 4765: 2007 Modified Polyvinyl Chloride (PVC-M) Pipes for Pressure Applications
AS/NZS 4766: 2006 Polyehylene Storage Tanks for Water and Chemicals
AS/NZS 4936: 2002 Air Admittance Valves for Use in Sanitary Plumbing and Drainage Systems
AS/NZS 5065: 2005 Polyethylene and Polypropylene Pipe and Fittings for Drainage and Sewerage Applications

ASSE 1050: 1991 Performance Requirements for Air Admittance Valves for Plumbing DWV Systems Stack Type Devices
ASSE 1051: 1992 Performance Requirements for Air Admittance Valves for Plumbing Drainage Systems

ASTM A 53 – 90a: 2012 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 106 – 91a: 2015 Specification for Seamless Carbon Steel Pipe for High Temperature Service

BS 10: 2009 Specification for Flanges and Bolting for Pipes, Valves And Fittings
BS 437: 2008 Specification for Cast Iron Spigot and Socket Drain Pipes and Fittings
BS 1256: 2000 Threaded Pipe Fittings in Malleable Cast Iron and Cast Copper Alloy
BS EN 10241: 2000 Steel Threaded Pipe Fittings

BS 4991:1974 (1982) Specification for Propylene Copolymer Pressure Pipe
BS 2971: 1991 Specification for Class II Arc Welding of Carbon Steel Pipework for Carrying Fluids
BS EN 10253-2: 2007 Butt-Welding Pipe Fittings – Non-Alloy and Ferric Alloy Steels with Specific Inspection Requirements
BS EN 10253-3: 2008 Butt-Welding Pipe Fittings – Wrought Austenitic and Austenitic-Ferritic (duplex) Stainless Steels Without Specific Inspection Requirements
BS EN 12056-2: 2000 Gravity Drainage Systems Inside Buildings. Sanitary Pipework, Layout and Calculation
BS EN 12585: 1999 Glass Plant, Pipeline and Fittings – Pipeline and Fittings DN 15 to 1000 – Compatibility and Interchangeability
BS 6464: 1984 Specification for Reinforced Plastics Pipes, Fittings and Joints for Process Plants

HB 230: 2008 Rainwater Tank Design and Installation Handbook

NZS 3501: 1976 Specification for Copper Tubes for Water, Gas, and Sanitation
NZS 4442: 1988 Welded Steel Pipes and Fittings for Water, Sewage and Medium Pressure Gas

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of Acceptable Solutions

G2 Wastewater Management

REQUIRED PERFORMANCE

.1 Collection, storage, treatment, use and disposal of WASTEWATER on the SITE must not be a nuisance or offensive to occupants, or to occupants on neighbouring properties, and must not contain HAZARDOUS SUBSTANCES (unless in accordance with Section E Hazardous Substances and deemed appropriate by the Government of Samoa).

.2 An on-site, adequate system for storage, treatment and discharge of WASTEWATER must be provided for every SITE where connections to a RETICULATED WASTEWATER SYSTEM is unavailable, and appropriate measures must be taken to accommodate a backup WASTEWATER SYSTEM should it fail.

.3 The type, capacity and location of an ON-SITE WASTEWATER MANAGEMENT system must be determined by a qualified PROFESSIONAL CONSULTANT based on:

(a) WASTEWATER characteristics

(b) expected rates of flow

(c) site and soil characteristics (slope, site stability, erosion potential, soil bearing capacity, GROUNDWATER depth, GROUNDWATER, etc.)

(d) adequate capacity for the volume of WASTEWATER and the frequency of disposal appropriate to the BUILDING type, use, occupancy

.4 If WASTEWATER disposal cannot be made by connecting to a RETICULATED WASTEWATER SYSTEM or by an ON-SITE WASTEWATER MANAGEMENT system, it must be disposed of through any, some, or all of the following methods deemed appropriate by the Government of Samoa relative to the location of the SITE and surrounding properties:

(a) aerobic septic system

(b) chemical, composting, incinerating and/or waterless TOILETS

(d) evaporation-transpiration (ET) septic systems

(d) septic media filters

(e) pressure dosing septic systems

(f) sand bed filters

(g) peat beds

(h) constructed wetlands, WASTEWATER lagoons

(i) septic disinfection systems

(j) any other system acceptable to the Government of Samoa

.5 An ON-SITE WASTEWATER MANAGEMENT system must:

(a) convey WASTEWATER to an appropriate OUTFALL or DISCHARGE AREA

(b) be constructed to avoid the likelihood of blockage

(c) be supported, jointed and protected in a way that will avoid the likelihood of penetration of roots or the entry of GROUNDWATER

(d) be provided with reasonable access for maintenance and clearing blockages

(e) be ventilated to avoid foul air and gases accumulating in the WASTEWATER system

(f) be constructed to avoid the likelihood of damage from superimposed loads or normal ground movement

(g) avoid the likelihood of ingress of SURFACE WATER, sub-surface water and STORMWATER into the WASTEWATER system

(h) avoid the likelihood of uncontrolled discharge

(i) avoid the likelihood of damage to existing BUILDINGS, FACILITIES, SITEWORK or adjacent property

(j) avoid the likelihood of damage to RETICULATED WASTEWATER SYSTEMS, ON-SITE WASTEWATER MANAGEMENT systems or other approved disposal system

.6 ON-SITE WASTEWATER MANAGEMENT and disposal must not have adverse impacts on the health and quality of:

(a) GROUNDWATER and POTABLE WATER

(b) terrestrial natural systems (trees, forests, mangroves) and hydric natural systems (ponds, rivers, lakes, ocean)

(c) standing water (DRAINAGE DITCH, GUTTER, DISCHARGE AREA, cesspool, STORMWATER MANAGEMENT wet pond)

(d) high WATER TABLE

(e) adverse soil conditions

(f) outdoor amenities (swimming pools, gathering areas, sports fields)

(g) crop lands

(h) fisheries

except where permitted by other legislation and policies of the Government of Samoa

.7 Security of ON-SITE WASTEWATER MANAGEMENT systems must be easily accommodated by:

(a) providing reasonable access for maintenance and clearing blockages

(b) avoiding the likelihood of unauthorised access by people

(c) avoiding the likelihood of damage from superimposed loads

.8 ON-SITE WASTEWATER MANAGEMENT systems that include TRADE WASTE must comply with the provisions of Section E Hazardous Substances and Section G6 Non-Domestic Solid and Liquid Waster in the NBC, and will be subject to rigorous on-site treatment appropriate to the contaminant.

.9 Evidence must be provided to confirm that the SITE proposed for the ON-SITE WASTEWATER MANAGEMENT system is unlikely to be subject to the following NATURAL DISASTERS

(a) erosion (including coastal erosion, bank erosion, sheet erosion)

(b) landslips

(c) falling debris (including soil and rock)

(d) subsidence

(e) inundation (including FLOODING, STORM SURGE, tidal effects, and ponding)

.10 ON-SITE WASTEWATER MANAGEMENT systems must be inspected, cleaned and maintained to minimise the likelihood of system malfunction and failure on a regular basis by qualified PROFESSIONAL CONSULTANT.

DEEMED-TO-SATISFY PROVISIONS

G2.A Wastewater System Capacity

.1 An ON-SITE WASTEWATER MANAGEMENT system for **Residential** properties will be deemed acceptable if:

(a) the SOAKPIT is
- (i) appropriately sized to the number of occupants / bedrooms at a rate acceptable to SWA (Samoa Water Authority)
- (ii) located not closer than 30 m from the boundaries of the SITE, where space permits, and no closer than 5 m from a boundary in the urban area of Apia
- (iii) constructed with no harmful impacts on the environment or neighbouring properties

(b) gross lot area to soakage area is at least 1.5: 1

(c) system complies with AS/NZS 1547:2000 Section 2.4.2.1 regarding the following SLUDGE and scum accumulation rates:
- (i) all-waste: 80 litres per person per year
- (ii) GREYWATER: 40 litres per person per year
- (iii) TOILET waste: 50 litres per person per year

(d) the septic tank can adequately store WASTEWATER, and
- (i) separate solid and liquid waste through anaerobic or aerobic means (or both),
- (ii) provides sufficient piped connections to the SOAKPIT or DISCHARGE AREA

and is either:

- (iii) constructed of reinforced concrete with an IMPERVIOUS surface that complies with Section B Stability of the NBC, or
- (iv) a tested and verified pre-fabricated tank from an acceptable manufacturer that meets all environmental standards of the NBC

(e) minimum septic tank size complies with Appendix B of AS/NZS 1546.1:1998, as shown in Table H2.A.1, and with AS/NZS 1547

Table H2.A.1: Recommended Minimum Septic Tank Sizes for Residential Properties

Wastewater Type	Number of People		Number of Bedrooms	
	1-5	6-10	1-3	4-6
All Wastewater	3,000 litres	4,500 litres	3,000 litres	4,500 litres
GREYWATER only	1,800 litres	2,700 litres	1,800 litres	2,700 litres
Toilet waste only	1,500 litres	2,500 litres	1,500 litres	2,500 litres

.2 An ON-SITE WASTEWATER MANAGEMENT system for properties other than a **Single Occupancy Unit** must comply with Section H2.A.1 (a) to (d) above, and the following:

(a) be sized appropriate to the use and function of the BUILDINGS, FACILITIES and SITE

(b) contain a specially-designed pre-treatment apparatus where the WASTEWATER would cause detriment or harm to the RETICULATED WASTEWATER SYSTEM

.3 To avoid overloading, the following measures must be used to minimise STORMWATER and GROUNDWATER from infiltrating the WASTEWATER system:

(a) watertight lids and risers

(b) watertight pipe connections

(c) install STORMWATER cut-off drains, where appropriate

(d) install subsurface cutoff drains to prevent GROUNDWATER infiltration, where necessary

.4 Calculation of design flows must be accomplished according to approved best practices and consider all water saving devices outlined in Section H Energy Efficiency.

G2.B Function, Layout and Setbacks

.1 All ON-SITE WASTEWATER MANAGEMENT systems must be designed and located to facilitate the removal of SLUDGE from the system by a SEPTAGE removal truck. Where vehicular access to the property is not available, an acceptable alternative method to DESLUDGE the system must be provided.

.2 The ON-SITE WASTEWATER MANAGEMENT system must not be subject to any vehicular traffic loading unless adequate protection is provided.

.3 Septic tanks must be placed on firm, stable, level ground on a minimum 100 mm depth base of compacted granular material, compacted sand or reinforced concrete.

.4 Septic tanks must be located as high in elevation as possible to ensure that WASTEWATER pipes are as shallow as possible. Notwithstanding the above, septic tanks must be placed deep enough to achieve an acceptable drainage gradient.

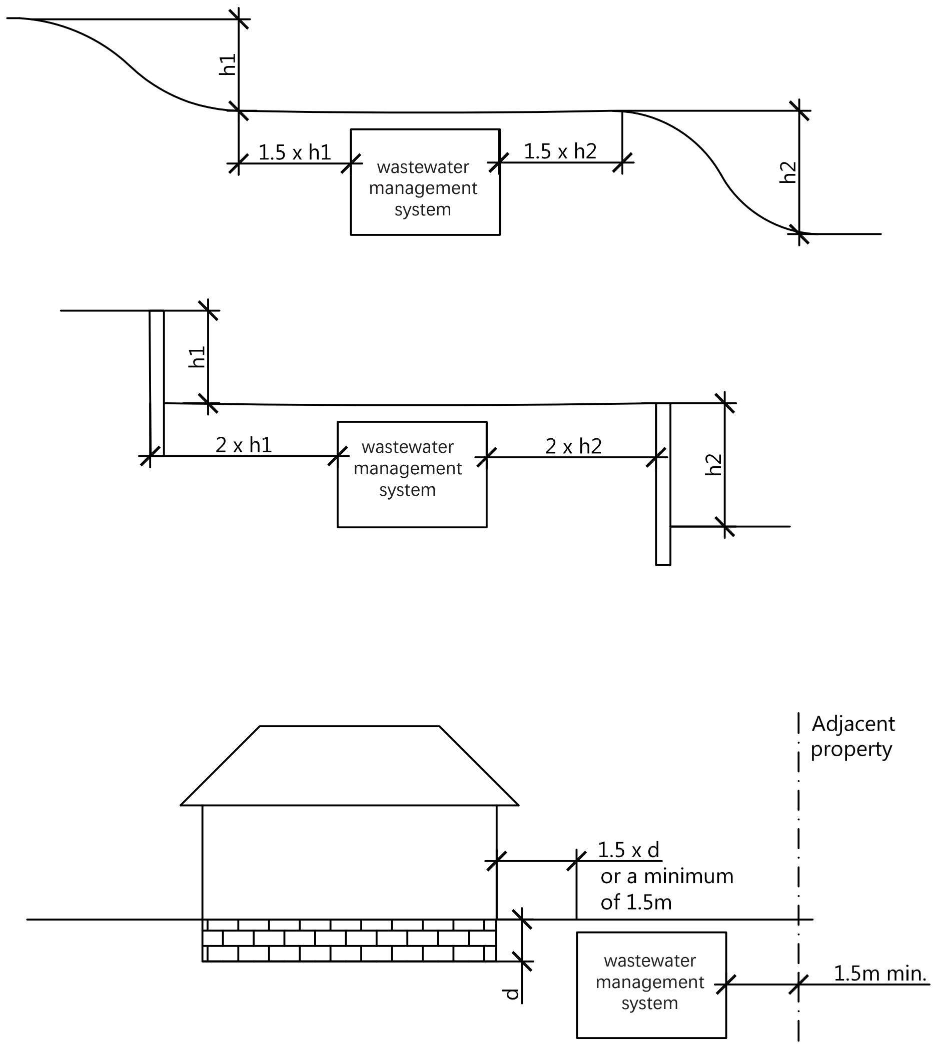
.5 Unless a specific engineering assessment has been undertaken by a suitably qualified PROFESSIONAL CONSULTANT confirming that the proposed ON-SITE WASTEWATER MANAGEMENT system will not affect slope stability, the following minimum SETBACKS (illustrated in Figure G2.B.5) must be achieved:

(a) 1.5 x the height of any embankment or slope

(b) 2 x the height of a retaining wall

(c) 1.5 x the depth of the foundations of any BUILDING with a minimum distance of 1.5 m

Figure G2.B.5: Minimum Setbacks for On-site Wastewater Management Systems



.6 For slopes greater than 6° (1:10 vertical to horizontal) that display evidence of any undulations, hummocks, tension cracks, scarps, terracettes, soil creep, land slippage, surface erosion, subsurface erosion ("under-runners") or any other form of land movement, land deformation, settlement, subsidence or erosion, a site-specific geotechnical investigation of the SITE proposed for an ON-SITE WASTEWATER MANAGEMENT system must demonstrate that the SITE proposed for the septic tank is unlikely to be subject to slope instability or that the tank will not induce slope instability. Such an assessment must be carried out by a suitably qualified PROFESSIONAL CONSULTANT acceptable to the Government of Samoa.

.7 Irrigation dosing systems, where appropriate, must be designed to ensure even distribution of WASTEWATER over the land application area.

.8 A suitable area (adequate soil structure, location on SITE) must be demonstrated in the BUILDING PERMIT application to accommodate a back-up WASTEWATER MANAGEMENT system in case of failure, and/or other means of WASTEWATER DISPOSAL must be shown to be readily available and easily implemented.

.9 For an upgrade or a replacement of an ON-SITE WASTEWATER MANAGEMENT system, evidence must be provided to demonstrate the structural and functional capability of the existing system components prior to re-use.

G2.C Site and Soil Evaluation Report

.1 An On-Site Wastewater Site and Soil Evaluation Report must be provided along with any BUILDING PERMIT application, and must be completed in general accordance with methods set out in:

(a) AS/NZS 1547:2000 Part 4: Means of Compliance and associated appendices (4.1A, 4.1B, 4.1C, 4.1D, 4.1E, 4.1F)

(b) AS/NZS 1547:2000 Figure 4.1B2 and Table 4.1C1

(c) best practices for health and safety regarding:
- (i) assessment of slope, site stability, erosion potential
- (ii) soil assessment

.2 The content, completeness and accuracy of the On-Site Wastewater Site and Soil Evaluation Report and associated field analysis and measurement must list:

(a) the soil assessment procedures and interpretation method to determine soil types

(b) the processes used and accuracy of the site evaluation to identify and describe site features and limitations

(c) WASTEWATER system specifications, layout drawings, component details, hydraulic design for the proposed design flow rate, occupancy allowances, including:
- (i) product or system Test Certificates, Producer Statements, Certified Approvals
- (ii) manufacturer specifications for installation, operational range or capacity and maintenance requirements
- (iii) construction details indicating stability, resistance to weather, and adequacy of treatment according to relevant sections of the NBC

(d) for any proprietary advanced ON-SITE WASTEWATER MANAGEMENT system::
- (i) Producer Statement relating to the NBC and relevant AS/NZS performance requirements and performance criteria
- (ii) Secondary-Effluent Producer Statement
- (iii) manufacturer design and operational specifications for installation, functional performance range and maintenance requirements
- (iv) availability of people with sufficient expertise for maintenance

(e) system performance, operational and maintenance requirements and the ability of these to be reliably met by the user

(f) identification and detail of land improvements to protect the function of the ON-SITE WASTEWATER MANAGEMENT system such as land drainage systems, embankments, raising or flattening land areas

(g) identification and specifications or detail for protection of a WASTEWATER system from damage - such as traffic protection, tree/growth root intrusion protection, protection from stock, hydrostatic uplift - anchorage to overcome buoyancy.

ACCEPTABLE SOLUTIONS

ANSI/ASME B16.1: 1989 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ANSI/ASME B16.5: 1988 Pipe Flanges and Flanged Fittings, Steel-Nickel Alloy and Other Special Alloys

API SPEC 5L: 1991 Specification for Line Pipe
API STD 1104: 1988 Welding of Pipelines and Related Facilities

AS 1579: 2001 Arc Welded Steel Pipes and Fittings for Water and Waste Water
AS 3571: 2009 Plastic Piping Systems – Glass Reinforced Thermoplastics (GRP) systems Based on Unsaturated Polyester (Up) Resin – Pressure and Non-Pressure Drainage and Sewerage (ISO 10467: 2004 MOD)
AS 1741: 1991 Vitrified Clay Pipes and Fittings with Flexible Joints
AS 2887: 1993 Plastic Waste Fittings
AS 3690: 2009 Installation of ABS Pipe Systems
AS 4139: 2003 Fibre Reinforced Concrete Pipes and Fittings

ASSE 1050: 1991 Performance Requirements for Air Admittance Valves for Plumbing DWV Systems Stack
ASSE 1051: 1992 Performance Requirements for Air Admittance Valves for Plumbing Drainage Systems

AS/NZS 1260: 2002 and 2009 PVC Pipes and Fittings for Drain, Waste and Vent Applications
AS/NZS 1546.1: 2008 On-Site Domestic Wastewater Management Units
- Part 1: Septic Tanks - applies to septic tanks, greywater tanks, holding tanks and pump wells
- Part 2: Waterless Composting Toilets
- Part 3: Aerated Wastewater Management Systems

AS/NZS 1547: 2000 Part 4: Means of Compliance
- Appendix 4.1A Site and Soil Evaluation: Procedures
- Appendix 4.1B Site and Soil Evaluation for Planning, Re-Zoning and Subdivision of Land
- Appendix 4.1C Site and Soil Evaluation for Individual Lots
- Appendix 4.1D Site and Soil Properties
- Appendix 4.1E Dispersive Soils and Sodicity
- Appendix 4.1F Soil-Permeability Measurement – Constant-Head Test
- Appendix 4.2C Water Balance and Land Application Systems

AS/NZS 1547: 2000 On-Site Domestic Wastewater Management
- Appendix 1 Site Assessment and Design Criteria
- Appendix 2 Assessment of Slope
- Appendix 3 Assessment of Site Stability
- Appendix 4 Criteria for On-Site Wastewater Systems on Sloping and/or Erosion Affected Ground
- Appendix 5 Summary of Clearances, Setbacks and Maximum Slope Gradients for Discharges

AS/NZS 1547: 2012 On-Site Domestic Wastewater Management
AS/NZS 1646: 2007 Elastomeric Seals For Waterworks Purposes
AS/NZS 2566: 2002 Buried Flexible Pipelines
AS/NZS 2642: 1994 Polybutylene Pipe Systems
- Part 1: 2007 Polybutylene (PB) Pipe Extrusion Compounds
- Part 2: 2008 Polybutylene (PB) Pipe for Hot and Cold Water Applications
- Part 3: 2008 Mechanical Jointing Fittings for Use with Polybutylene (PB) Pipes for Hot and Cold Water

AS/NZS 2845: 2010 Water Supply - Backflow Prevention Devices
AS/NZS 3500: 2013 National Plumbing and Drainage Code
- Part 1: 2003 Water Services
- Part 2: 2003 Sanitary Plumbing and Drainage
- Part 4: 2003 Heater Water Services
- Part 5: 2012 Housing Installations

AS/NZS 3518: 2004 Acrylonitrile Butadiene Styrene (ABS) Compounds Pipes and Fittings for Pressure Applications
AS/NZS 4058: 2007 Pre Cast Concrete Pipes (Pressure and Non-Pressure)
AS/NZS 4129: 2008 Fillings for Polyethylene (PE) Pipes for Pressure Applications
AS/NZS 4130: 2009 Polyethylene (PE) Pipe for Pressure Applications
AS/NZS 4401: 2006 High Density Polyethylene (PE-HD) Pipes and Fittings for Soil and Waste Discharge (low and high temperature) Systems Inside Buildings
AS/NZS 4765: 2007 Modified Polyvinyl Chloride (PVC-M) Pipes for Pressure Applications
AS/NZS 4936: 2002 Air Admittance Valves for Use in Sanitary Plumbing and Drainage System

ATS 5200.460: 2005 Technical Specification for Plumbing and Drainage Products - Greywater Diversion Device (GWDD)

BS 10: 2009 Specification for Flanges and Bolting for Pipes, Valves and Fittings
BS 437: 2008 Specification for Cast Iron Spigot and Socket Drain Pipes and Fittings
BS 1256: 2000 Threaded Pipe Fittings in Malleable Cast Iron and Cast Copper Alloy
BS 2971: 1991 Specification for Class II Arc Welding of Carbon Steel Pipework for Carrying Fluids
BS 3799: 1974 Specification for Steel Pipe Fittings, Screwed and Socket-Welding for the Petroleum Industry
BS 7159: 1989 Code of Practice for Design and Construction of Glass-Reinforced Plastics (GRP) Piping Systems for Individual Plants or Sites
BS 4991:1974 (1982) Specification for Propylene Copolymer Pressure Pipe
BS EN 10241: 2000 Steel Threaded Pipe Fittings
BS EN 12056-2: 2000 Gravity Drainage Systems Inside Buildings - Sanitary Pipework, Layout and Calculation
BS EN 12585: 1999 Glass Plant, Pipeline and Fittings – Pipeline and Fittings DN 15 to 1000 – Compatibility and Interchangeability
BS 6464: 1984 Specification for Reinforced Plastics Pipes, Fittings and Joints for Process Plants

HB 326: 2008 Urban Greywater Installation Handbook for Single Households

NZS 3501: 1976 Specification for Copper Tubes for Water, Gas, and Sanitation
NZS 4442: 1988 Welded Steel Pipes and Fittings for Water, Sewage and Medium Pressure Gas

NZS/BS 970: 1991 Specification for Wrought Steels and for Mechanical and Allied Engineering Purposes
NZS/BS 3601: 1987 Specification for Carbon Steel Pipes and Tubes with Specified Room Temperature Properties for Pressure Purposes

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- Any required permits from the Government of Samoa regarding health and safety for water supply, sanitation and management

- An On-Site Wastewater Site and Soil Evaluation Report providing the following details of the ON-SITE WASTEWATER MANAGEMENT system:

  Proposed location of WASTEWATER pipes, buildings, and all other structures as well as components required by AS/NZS 3500, including ON-SITE WASTEWATER MANAGEMENT system showing compliance with all SETBACK distances and all required pipework and appurtenances within the system

  Details and location of any watercourse or body of water on the site or in close proximity to it, including any water source used for agricultural, aquaculture or stock purposes

  Existing contours, proposed grading and impacts of grading on ON-SITE WASTEWATER MANAGEMENT system

  Method of connecting the internal sanitary PLUMBING fixtures of a BUILDING or FACILITY to the external WASTEWATER system including location, size, grade, piping junctions and bends of WASTEWATER pipes, inspection openings and inspection SHAFTs, position and size of overflow relief gullies,and vents

  Details of the stormwater management system including any measures to collect surface or migrating GROUNDWATER, roof and hard surface RUNOFF

  Details of any trade waste and required treatment apparatus

  Documentation of all HAZARDOUS SUBSTANCES indicating usage, storage, transport and method of removal according to Section E Hazardous Substances

G3 Water Supply

REQUIRED PERFORMANCE

.1 SANITARY FIXTURES, SANITARY COMPARTMENTS and WET AREAS that provide POTABLE water must have safe and adequate piped water supply. from one or a combination of the following POTABLE water sources:

(a) RETICULATED WATER SUPPLY

(b) water collection tank

(c) a well

(d) other means acceptable to the Government of Samoa

.2 GREYWATER must only be used as a non-POTABLE water supply for appropriate uses.

.3 POTABLE water and GREYWATER that supply SANITARY FIXTURES, SANITARY COMPARTMENTS and WET AREAS must have flow rates and pressures adequate for the correct functioning of these items under normal conditions and in a manner that does not create undue noise.

.4 Safe use and operation of the WATER SUPPLY SYSTEM must:

(a) avoid the likelihood of leakage or failure, including uncontrolled discharges

(b) allow access for maintenance of components and operational controls

(c) have a backflow retention device wherever there is a possibility of contaminating the water supply

.5 Heated WATER SUPPLY SYSTEMS must:

(a) prevent growth of Legionellae bacteria or other harmful disease

(b) protect users from scalding during personal hygiene activities

(c) be safe from explosion

DEEMED-TO-SATISFY PROVISIONS

G3.A Water Supply Components

.1 Every part of a water supply system must be constructed in an appropriate manner, using materials and products that are fit, certified and authorised for the purpose for which they are intended.

.2 Materials which are not certified by a recognised agency may be deemed acceptable if the process for certification and authorisation outlined in Part G1 of the Building Code of Australia, Volume 3, Plumbing Code, is followed and deemed appropriate by the Government of Samoa.

.3 Materials for a water supply system must comply with AS/NZS 4020 and be appropriate to:

(a) type of usage likely to occur and the nature of the water supply

(b) site characteristics and nature of the environment

.4 Pressure vessels used for producing and/or storing heated water must be provided with safety devices which:

(a) relieve excessive pressure during both normal and abnormal conditions

(b) limit temperatures to avoid the likelihood of flash steam production in the event of rupture

G3.B Potable Water

.1 Unintentional heating of POTABLE water must be prevented through:

(a) avoiding long runs of pipework in locations exposed to solar heat gain, such as an attic, and/or

(b) applying INSULATION either directly to the pipework or within the surrounding AIR SPACE

.2 Water pipes and outlets provided with POTABLE and non-POTABLE water must each be clearly identified.

G3.C Greywater and Non-Potable Water

.1 A GREYWATER system, consisting of pipes, GREYWATER diversion device, backflow preventer, filtration and DISCHARGE AREA, must be used to reduce the amount of WASTEWATER conveyed to RETICULATED WASTEWATER SYSTEMS where required by the Government of Samoa, or when conservation of energy, natural resources and the environment is desired.

.2 A non-POTABLE water supply, including GREYWATER, must only be connected to outlets clearly identified for such use and must be limited to the following uses:

(a) garden watering

(b) TOILET and urinal flushing

(c) clothes washing

(d) industrial purposes

(e) fire-fighting

(f) dust suppression

(g) any other use authorised by the Government of Samoa

.3 Non-POTABLE water and GREYWATER must not have a cross connection with a POTABLE water supply, or discharge directly in any soil used for vegetable or fruit production.

.4 A continuous flow of non-POTABLE water and/or GREYWATER must be provided by:

(a) minimum 2% slope for all pipes

(b) no U-pipes or other complicated pipes that trap solids

and

(c) 35 - 50 mm dia. pipes or

(d) pressurised pipes

.5 Where a property is served by a non-POTABLE water supply and/or GREYWATER system:

(a) a backflow prevention device suitable for the degree of HAZARD and sized to suit the capacity of the drinking water supply must be fitted to the POTABLE water pipes at:
(i) the meter, or
(ii) the point of connection, where a meter is not installed

(b) a low hazard backflow prevention device must be fitted to each external POTABLE water hose tap outlet

.6 A GREYWATER system must:

(a) be installed only where sufficient land area exists to safely dispose of GREYWATER on the SITE

(d) only use water from acceptable sources that are not exposed to industrial toxins or chemical compounds other than for personal hygiene

.7 SETBACKS for GREYWATER DISCHARGE AREA:

(a) minimum 30 m from a waterbody (stream, river, lake) or a well

(b) minimum 15 m from a HABITABLE BUILDING

(c) minimum 15 m from the SITE boundary

G3.D Water Collection Tanks

.1 Water collection tanks must be designed, constructed and installed in a manner that minimises the risk of contamination from industrial pollutants, dust, leaves, pollens, pesticide sprays, fertilisers, debris, vermin, birds, small animals and insects, and must prevent the possibility of becoming a breeding sites for mosquitos.

.2 Water collection tanks must:

(a) be constructed of reinforced concrete with an IMPERVIOUS surface that complies with Section B Stability of the NBC

(b) have IMPERVIOUS covers and all access points, except for the inlet and overflow, and provided with close-fitting lids designed to be kept shut unless in use

(c) be a tested and verified pre-fabricated tank from an acceptable manufacturer that meets all environmental standards of the NBC

(d) incorporate a ‘first flush system’ or other diversion system that will prevent the first flush of water from entering the tank

(e) have a backflow prevention device installed that prevents contaminated water from flowing into the water collection tank, an on-site WATER SUPPLY SYSTEM or a RETICULATED WATER SUPPLY system

(f) have all inlets protected by a screen to prevent material, such as leaves etc., from being washed into the tank and a mesh covering to prevent access of mosquitos and other insects

(g) be protected from sunlight to minimise algal growth

(h) prevent infestation from mosquitos by:
   (i) ensuring all parts are AIRTIGHT except for inlets and overflows
   (ii) using a close fitting lid sufficiently sealed to prevent mosquitos from entering
   (iii) using tight-fitting mesh for inlets and overflows with openings that prevent mosquitos from entering
   (iv) grading land around watertank with a positive slope of 2% so that any RUNOFF, stormwater, or overflow water will not pond near the tank

.3 Underground water collection tanks must:

(a) be protected against entry of RUNOFF, GROUNDWATER, animal or human faecal material

(b) provide access for maintenance and cleaning

.4 Roof catchment areas for water collection tanks must be free from the following potential sources of contamination:

(a) overhanging vegetation

(b) flues and chimney residue

(c) overflows / discharges / bleed-off pipes from roof-mounted appliances, such as evaporative air conditioners, hot water supply, and solar heaters

(d) uncoated lead flashing

(e) exposed preservative-treated timber

(f) solar hot water systems

.5 Roof catchment areas for water collection tanks must not be installed on::

(a) recently painted roofs (until after the first few rainfalls)

(b) timber roofs preserved with chemicals

(c) roofs coated with lead flashings, lead-based paints or tar-based coatings

(d) parts of roofs near flues, smoke stacks and chimneys

.6 Testing of water from the following sources must be conducted and approved prior to considering the use of it for a water collection tank:

(a) SURFACE WATER

(b) deep GROUNDWATER aquifers

(c) shallow ground water

.7 Roof and associated GUTTERS must be kept clean of leaves, animal remains, dust and other debris by installing screens or leaf diverters between the roof and the water tank.

G3.E Heated and Cold Water Supply

.1 The design, construction, installation, replacement, repair, alteration and maintenance of cold water supply must be in accordance with:

(a) for **Single Unit Residential** and **Storage Buildings** - Section 2 of AS/NZS 3500.5 for DEVELOPMENTS of 20 UNITS or less

(b) for all other BUILDINGS - AS/NZS 3500.1

.2 The design, construction, installation, replacement, repair, alteration and maintenance of heated water supply must be in accordance with:

(a) for **Single Unit Residential** and **Storage Buildings** - Section 3 of AS/NZS 3500.5 for DEVELOPMENTS of 20 UNITS or less

(b) for all other BUILDINGS - AS/NZS 3500.4

.3 Heated water intended for human consumption, food preparation, food utensil washing or personal hygiene must be:

(a) POTABLE

(b) delivered to fixtures and appliances used primarily for personal hygiene at a temperature which reduces the likelihood of scalding, see Table G3.E.3

Table G3.E.3: Scalding Time from Hot Water

Water Temperature °C	Major Burn Time
49	5 minutes
52	1.5 - 2.0 minutes
54	30 seconds
57	10 seconds
60	< 5 seconds
63	< 3 seconds
66	1.5 seconds
68	1 second

.4 Excessive ‘dead water draw-off, (i.e. where cooled water from the supply pipe is drained off prior to delivery of heated water) must be avoided by an efficient water flow design that considers:

(a) the number of outlets, their purpose and expected typical usage

(b) the distance between the water heater and each of the outlets

(c) positioning the water heater unit nearest to the most used outlets or to provide consistent coverage of the BUILDING or FACILITY

(d) other measures which maximise efficient distribution of water at the desired temperature such as an additional unit or flow and return pipe loop

.6 Where both heated water and cold water are installed to supply a SANITARY FIXTURE, the heated water tap must be installed to the left of, or above, the cold water tap.

G3.F Water Usage and Conservation

.1 For BUILDING GROUP 1-5, a cistern or flushing valve used for the purpose of flushing a TOILET must have a dual flushing mechanism that, when operated, discharges:

(a) for a 6/3 litre cistern:
(i) not less than 5.5 litres and not more than 6.5 litres for a full flush
(ii) not less than 3.0 litres and not more than 3.5 litres for a reduced flush

(b) for a 4.5/3 litre cistern:
(i) not less than 4.3 litres and not more than 4.7 litres for a full flush
(ii) not less than 2.8 litres and not more than 3.2 litres for a reduced flush

(b) the volume of water discharged to flush a urinal must not exceed 2.5 litres for each:
(i) single urinal stall, or
(ii) 600 mm length of a continuous urinal wall, or part thereof

(c) AUTOMATIC or set-cycle cisterns must not be installed

.2 A cold, heated or combined water supply of a shower, basin, kitchen sink or laundry trough must have a maximum flow rate of not more than 9 litres per minute, with the exception of a shower intended to provide rapid drenching of a person for emergency purposes, such as chemical removal.

.3 Heated water supply, including any associated distribution system and components must, to the degree necessary:

(a) have features that facilitate the efficient use of energy appropriate to:
(i) the heated water supply and its usage
(ii) the geographic location of the BUILDING
(iii) the location of the heated water supply
(iv) the energy source

(b) obtain its heating energy from:
(i) a low GREENHOUSE GAS EMISSIONS energy source such as a water heater with an Energy Star rating, or
(ii) an on-site RENEWABLE ENERGY source such as solar, wind, geothermal, hydroelectric, wave action (see Section H4), or
(iii) another process acceptable to the Government of Samoa as reclaimed energy

.4 Water supply for showers, lavatories, washing machine, main kitchen sink and dishwashers must have:

Non-residential BUILDINGS in BUILDING GROUPS 1-4:
(a) high WELS star rating (Water Efficiency Label Standard as set out in Australia's Water Efficiency Labeling and Standards Act 2005) or equivalent

(b) low flow rates (L/min) - below 9 L/min - as identified according to WELS star rating

All other BUILDINGS:
(c) ENERGY EFFICIENT water fixtures

ACCEPTABLE SOLUTIONS

AS 1579: 2001 Arc Welded Steel Pipes and Fittings for Water and Wastewater
AS 1646: 2007 Elastomeric Seals for Waterworks Purposes
AS 2070: 1999 Plastic Materials for Food Contact Use
AS 3498: 2009 Authorisation Requirements for Plumbing Products - Water Heaters and Hot-Water Storage Tanks
AS 3688: 2005 Water Supply – Copper and Copper Alloy Compression and Capillary Fittings and Threaded End Connectors
AS 3735: 2001 Concrete Structures Retaining Liquids

AS/NZS 2712: 2007 Solar and Heat Pump Water Heaters - Design and Construction
AS/NZS 2845: 2010 Water Supply - Backflow Prevention Devices
AS/NZS 3500: 2015 Plumbing and Drainage - Part 1 Water Services
AS/NZS 3896: 1998 Waters – Examination for Legionellae Including Legionellae pneumophila
AS/NZS 4020: 2005 Testing of Products for Use in Contact with Drinking Water
AS/NZS 4234: 2008 Heated Water systems - Calculation of Energy Consumption
AS/NZS 4765: 2007 Modified Polyvinyl Chloride (PVC-M) Pipes for Pressure Applications

ASTM A 106 – 91a: 2015 Specification for Seamless Carbon Steel Pipe for High Temperature Service

BS 6920: 2000 Suitability of Non-Metallic Products for Use in Contact with Water Intended for Human Consumption
Part 1: 2000 Specification G12/AS1
Part 2: 2000 Methods of Tests G12/AS1
Part 3: 2000 High Temperature Tests
BS 7190: 1989 Assessing Thermal Performance of Low Temperature Hot Water Boiler Using a Test Rig

New Zealand Backflow Testing Standard 2011 AS1 3.6.1 b), 3.7.2
Field Testing of Backflow Prevention Devices and Verification of Air Gaps

New Zealand Ministry of Health:
2005 Drinking Water Standards for New Zealand
2006 Household Water Supplies

NZS 4442: 1988 Welded Steel Pipes and Fittings for Water, Sewage and Medium Pressure Gas

Acceptable Solution G12/AS1 Water Supplies
3.4 Backflow Protection
3.5 Air Gap
3.6 Backflow Prevention Devices
4.0 Non-Potable Water Supply
5.1 Water Tanks

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- List of Manufacturer, Model, energy efficiency rating (eg. WELS star rating) and/or product sheet describing ENERGY EFFICIENCY for all fixtures for showers, sinks, TOILETs, washing machine and dish washers, and all water collection tanks

G4 Electrical Safety

REQUIRED PERFORMANCE

THIS SECTION MUST BE READ ALONG WITH SECTION C1.A PREVENTION OF FIRE OCCURRING - ELECTRICAL WORK, SECTION C3.I FIRE SEPARATION OF ELECTRICAL SUPPLY SYSTEMS, AND SECTION E HAZARDOUS SUBSTANCES

.1 All ELECTRICAL INSTALLATIONS (WIRING, components and equipment) must comply with all provisions in AS/NZS 3000: 2007 ELECTRICAL INSTALLATIONS (the Wiring Rules), as amended, except where provisions in the NBC indicate otherwise.

.2 The electrical system in a BUILDING, FACILITY or SITE must be designed and constructed so that it can be efficiently and effectively isolated and controlled by EMERGENCY RESPONDERS.

.3 Every alteration, addition and repair of an existing ELECTRICAL INSTALLATION is deemed to be a new ELECTRICAL INSTALLATION and a BUILDING PERMIT must be attained that complies with the NBC, and requirements of the EPC (Electrical Power Corporation).

.4 Design and installation of ELECTRICAL INSTALLATIONS, including WIRING, components and equipment, must:

(a) protect people from shock by ensuring that access to LIVE parts is restricted, and any conductive parts that are ACCESSIBLE must not be LIVE under normal conditions or single FAULT conditions

(b) permit the safe isolation of the installation and of electrical fittings and appliances

(c) safeguard people from excessive temperatures resulting from either normal operation of ELECTRICAL EQUIPMENT and WIRING, or from CURRENT which could exceed the installation rating

(d) safeguard people from injury which may result from electromechanical stress in ELECTRICAL EQUIPMENT and WIRING caused by CURRENT in excess of the installation rating

(e) protect BUILDING ELEMENTS from risk of ignition, impairment of their physical or mechanical properties, or function, due to temperature increases resulting from heat transfer or electric arc

(f) operate safely in its intended environment, and be installed according to manufacturer's instructions

.5 An ELECTRICAL INSTALLATION supplying an ESSENTIAL FACILITY must:

(a) maintain the supply for a time appropriate to that purpose of the ESSENTIAL FACILITY

(b) be capable of being isolated from the supply system, independently of the remainder of the installation

.6 An ELECTRICAL INSTALLATION in a BUILDING, FACILITY or SITE connected to a RETICULATED electrical supply system, must contain safeguards which protect the safety features of the RETICULATED supply.

.7 All parts of an ELECTRICAL INSTALLATION must be adequately protected against damage that can reasonably be expected from the environment or other influences to which it may be exposed during normal use of the BUILDING, FACILITY and SITE, including damage from exposure to:

(a) weather

(b) water

(c) flora and fauna

(d) seismic activity

(e) corrosive fumes

(f) galvanic action

(g) accumulation of dust, steam, oil

(h) temperature

(i) explosive atmospheres

(j) vibration

DEEMED-TO-SATISFY PROVISIONS

G4.A Installer Qualifications

.1 All installers must comply with the regulations of the Samoa Electrical Power Corporation (EPC) listed in Table G4.A.1, and must be on the list of Certified Installers published by the EPC.

Table G4.A.1: Requirements for Electrical Installers

Installer Requirements	Grade A *Unrestricted*	Grade B *Allowed to work on single and three phase installations up to 60 Amperes*	Grade C *Allowed to work on single phase installations up to 30 Amperes*
Minimum Qualifications	Diploma in Electrical Engineering or equivalent First Aid Certificate	Apprenticeship Certificate or equivalent First Aid Certificate	Year 11 or Form 5 Secondary School Education First Aid Certificate
Required Experience	Five years experience working in commercial and industrial installations	Five years experience in domestic installations	15 years experience as an electrician trainee
Proof of Experience	Proof of five industrial or commercial ELECTRICAL INSTALLATION projects where proponent was a major player in installation, testing and COMMISSIONING	Proof of five domestic installations where the proponent was involved in installation and testing	Proof of 10 domestic installations where the proponent was involved installation and testing
Equipment Knowledge / Experience	Insulation Tester (1 kV Megger), multimeter, earth tester and test leads		
Required Tools	Tool box consisting of electrical insulated screwdrivers, pliers, crimping tool, cable cutters		
Required Knowledge	AS/NZS 3000 Wiring Standards		

G4.B Electrical System Design and Construction

.1 The electrical system design must be appropriate to the use, scale and function of the BUILDING, FACILITY or SITE, and provide electricity for the following (where applicable):

(a) lighting, appliances, machinery

(b) heating and cooling

(c) access - lifts, conveyors, AUTOMATIC doors

(d) water supply distribution, heating and cooling

(e) communication system - phones, computer systems, terminals, sound, video

(f) safety -systems, emergency response and alarm procedures

.2 The electrical system for a BUILDING, FACILITY and/or SITE, including multiple structures, must provide for the safe supply and distribution of electricity from a RETICULATED electricity supply or RENEWABLE ENERGY system (such as solar panels, wind turbines), and include the following components:

(a) service entry CABLE - connection from the energy supplied to the SITE to the transformer or directly to the electricity meter if a transformer is not required, or to the MAIN SWITCHBOARD for RENEWABLE ENERGY systems

(b) transformers, where needed to lower voltage from the electrical supply to an appropriate voltage for usage

(c) electric meter - must be mounted on, close to, or inside the BUILDING, FACILITY or on-site power consumption apparatus

(d) MAIN SWITCHBOARD - provides switches for power distribution to rooms, UNITS or on-site power consumption apparatus, CIRCUIT-breakers, emergency system controls, fuses to protect from over-heating

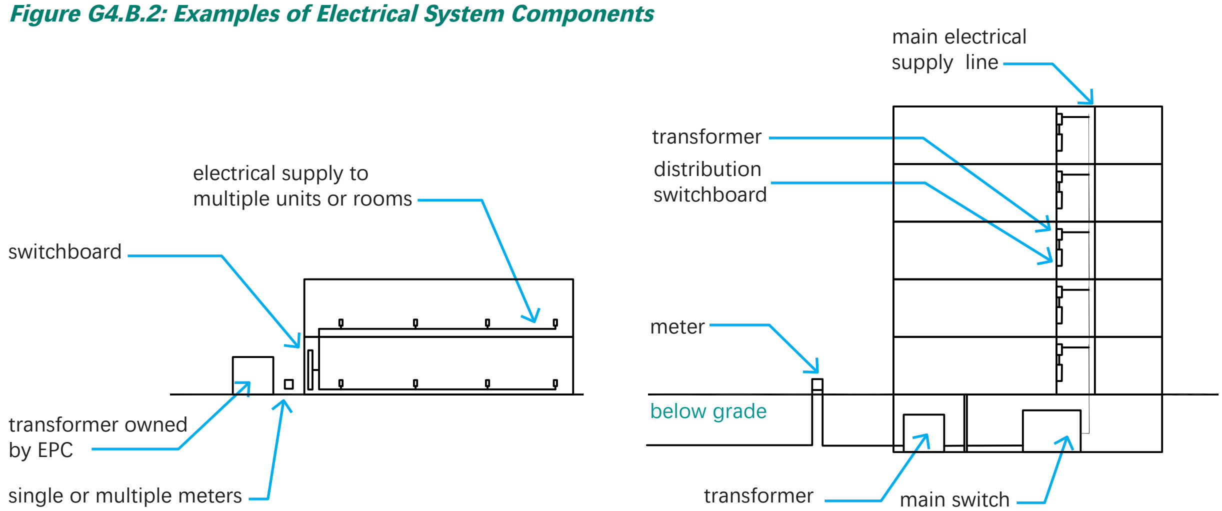
(e) DISTRIBUTION SWITCHBOARDS, where deemed appropriate - for **Multiple Unit Buildings**, safe operation of industrial processes, handling of HAZARDOUS SUBSTANCES, or other use whose safe operation depends on it having a SWITCHBOARD specifically for its use

(f) CIRCUITS - a system of consisting of CONDUCTORS, CABLES and WIRING, junction boxes, and the like, that provide power from a SWITCHBOARD to room, UNITS or on-site power consumption equipment

(g) plugs/wall outlets/sockets - devices through which appliances, machinery, lighting and communication equipment can be powered by electricity

(h) use a MEN (Multiple Earth Neutral) system that conforms with the AS 3000 Wiring Rules

Figure G4.B.2: Examples of Electrical System Components



.3 ELECTRICAL INSTALLATIONS operated by remote control must be clearly identified in appropriate locations, and must:

(a) cause the MAIN SWITCH to isolate supply to the associated parts of the installation

(b) be designed and installed to prevent inadvertent closing because of a fault or malfunction in CIRCUITRY or auxiliaries

(c) have the capability to be locked in the open position, or the closed position, but with an over-riding switch that can be operated in emergencies

.4 The connected load (total electric power consumption of all devices in an electrical system) must be calculated for all outlets in rooms, UNITS and on-site power consumption apparatus, and approved by the Electrical Power Corporation (EPC).

.5 ELECTRICAL EQUIPMENT must be safely installed by:

(a) following manufacturer's instructions

(b) following appropriate construction safety measures to protect BUILDING ELEMENTS, BUILDING MATERIAL and SITE SERVICING from fire and damage

(c) providing adequate and safe access or working space for installation and maintenance personnel

(d) ensuring adequate strength and appropriateness of fixings, fastenings and supports

(e) not permitting use of semi-enclosed re-wireable fuses

(f) ensuring that socket-outlets are polarised in accordance with the product specification

(g) selecting an appropriate location for exterior ELECTRICAL EQUIPMENT

(h) providing additional protection against electric shock where the presence of water or high humidity presents an increased risk

.6 Construction techniques and devices to prevent or remove HAZARDS associated with ELECTRICAL INSTALLATION must be provided during construction, including:

(a) slope retention / shoring

(b) restricted access to LIVE parts

(c) isolating every CIRCUIT from each of the supply CONDUCTORS, including a group of CIRCUITS isolated by a common switch

(d) supplying warning notices anywhere that LIVE parts connect to more than one supply indicating the need to isolate those parts unless they are suitably isolated

(e) preventing ELECTRICAL EQUIPMENT from being inadvertently energised by providing a padlock, warning tags and/or notices, or location in locked room or enclosure

(f) prevention of solid foreign bodies from entering the electrical system

G4.C Shock Protection

.1 Electrical systems and installations must be provided with control and isolation devices that:

(a) are separate from other equipment

(b) interrupt all active CONDUCTORS

(c) do not interrupt an PROTECTIVE EARTHING CONDUCTOR

.2 Different methods of shock protection applied to the same ELECTRICAL INSTALLATION must have no influence on each other such that failure of one method could impair the operation of the other.

.3 LIVE parts of a separated CIRCUIT must not be connected to the earth or to another CIRCUIT at any point.

.4 Danger arising from direct or indirect contact with LIVE parts of an ELECTRICAL INSTALLATION and OVERCURRENTS during normal use of the BUILDING, FACILITY or SITE must be avoided by providing any, some, or all of the following:

(a) appropriate INSULATION for the intended use

(b) barriers or enclosures that are firmly secured in place, have adequate structural STABILITY, and have appropriate warning labels / signs

(c) placement of suitable FIRE-RESISTANT obstacles that prevent access / contact with LIVE parts

(d) appropriate siting where LIVE parts cannot be accessed during normal use and operation of the BUILDING, FACILITY or SITE, and restricted access is available for suitably qualified maintenance personnel

(e) bonding exposed conductive parts to a PROTECTIVE EARTHING CONDUCTOR

(f) provision of AUTOMATIC disconnection devices in locations suitable to prevent unexpected CURRENT flows to exposed parts, and to prevent CURRENT flows that exceed safe voltage levels, in addition to at least one other measure in (a) to (e) above

(g) limiting the maximum OVERCURRENT to a safe value and duration

.5 Contact with LIVE parts at a termination must be avoided by:

(a) restraining the CONDUCTOR by tying, lacing or clipping, or

(b) containing the CONDUCTOR within a non-conductive shroud or WIRING ENCLOSURE

G4.D Voltage

.1 To permit a connection to the RETICULATED electrical supply, ELECTRICAL INSTALLATIONS and systems must be designed to support the voltage supplied by the Electrical Power Corporation (EPC) as follows:

(a) LV (low voltage) single phase: EPC 240V

(b) LV (low voltage) three phase: 415V

.2 Protection against harm due to the effects of a FAULT between LIVE parts of CIRCUITS supplied at different voltages must be provided by:

(a) separation

(b) installation of devices for protection against overvoltages such as transformers, fuses, and the like

.3 Maximum electricity demand for a BUILDING, FACILITY and/or and SITE must be determined according to methods acceptable to the Government of Samoa, and be appropriate to the:

(a) capacity (power mains, SUBMAINS, ELECTRICAL EQUIPMENT type and size)

(b) physical distribution of ELECTRICAL EQUIPMENT and WIRING

(c) intended use of the BUILDING, FACILITY and SITE

.4 The voltage at the terminals of electrical appliances and equipment (outlets) must be suitable for the normal operating operation of the appliances and equipment supplied. Likewise, the voltage rating, CURRENT, frequency and power of ELECTRICAL EQUIPMENT must be suitable for the outlet and/or CIRCUIT to which it is connected and for the intended use and capacity of the electrical system.

.5 Plugs and outlets / sockets must be 3 pin grounded type (220-240V) as shown in Figure G4.D.5, and all outlets must have an off-/on switch for each connection

Figure G4.D.5: 3-Pin Plug and Outlet/Socket

G4.E Circuits

.1 Every ELECTRICAL INSTALLATION must be divided into CIRCUITS, as necessary, to:

(a) avoid danger and minimise inconvenience in the event of a FAULT

(b) facilitate safe operation, inspection, testing and maintenance of the electrical system

.2 The number of CIRCUITS in an electrical system or installation must be appropriate to:

(a) the ELECTRICAL EQUIPMENT type, size, function operational requirements and load

(b) function and use of the BUILDING, FACILITY and/or SITE

.3 Design of the CIRCUITRY network must incorporate means to effectively deal with:

(a) consequences of CIRCUIT failure including loss of supply to ESSENTIAL FACILITIES and equipment, overload and ability to locate a FAULT

(b) required maintenance, including alterations and additions needed without interrupting the electrical supply elsewhere

.4 CIRCUITRY in an ELECTRICAL INSTALLATION must provide electrical continuity, an appropriate level of INSULATION and adequate mechanical strength.

G4.F Switchboards

.1 All SWITCHBOARDS must be:

(a) installed in suitable, well-ventilated places

(b) protected against the effects of moisture

(c) located so that access is not obstructed by BUILDING MATERIALS, ASSEMBLIES, SITE SERVICING, fittings, fixtures, doors, or any other BUILDING ELEMENT

(d) ACCESSIBLE so that a PERSON WITH A DISABILITY can operate the MAIN SWITCH in a REQUIRED ACCESSIBLE BUILDING

(e) permanently marked as “Main Switchboard”, "Distribution Switchboard" and/or "Secondary Switchboard", and have appropriate instructional signage for occupancy and use

.2 All SWITCHBOARDS must **not** be located:

(a) within 1.2 m of the ground, floor or platform

(b) above open water containers or fixed or stationary cooking appliances

(c) in cupboards unless explicitly designed to house a SWITCHBOARD or in a separate section of the cupboard where only the SWITCHBOARD will be located

(d) where there are projections that obstruct access for the operation and maintenance of the SWITCHBOARD

(e) within 0.3 m of a floor or wall that is part of a WET AREA or within 3.0 m of a swimming pool

(f) within a REFRIGERATION ROOM

(g) within a FIRE-ISOLATED STAIRWAY, PASSAGEWAY or RAMP, and within any other part of an EVACUATION ROUTE unless it is located in a FIRE-RESISTANT compartment with doors that are sealed against the spread of smoke

(h) within a cupboard containing a FIRE HOSE REEL

(i) near AUTOMATIC fire-sprinklers if they are connected to the MAIN SWITCHBOARD or ones which supply power for safety services during emergencies

(j) in parts of a BUILDING, FACILITY or SITE where HAZARDOUS SUBSTANCES are stored, processed or transported, unless installed in accordance with AS/NZS 2381 and specifically designed for that purpose

.3 A MAIN SWITCHBOARD that divides an incoming-power supply (from the EPC and/or an RENEWABLE ENERGY system) into separate CIRCUITS, each of which is controlled and protected by the fuses or switchgear of the SWITCHBOARD, must be provided for each ELECTRICAL INSTALLATION in a BUILDING, FACILITY and/or SITE, and may be connected to one or more DISTRIBUTION SWITCHBOARDS.

.4 A MAIN SWITCHBOARD must control the supply of every ELECTRICAL INSTALLATION in the BUILDING, FACILITY or SITE by:

(a) a MAIN SWITCH controlling all electrical supply where there is the potential for the power supply to present an unexpected danger to people, property or the environment, or

(b) multiple switches each controlling a portion or the entire electrical supply - the number of MAIN SWITCHES must be kept to the minimum practicable to provide for effective operation in an emergency

.5 All MAIN SWITCHBOARDS, other than for **Single Unit Residential**, **Retail,** and **Fales**, must have emergency equipment switchgear separated by metal partitions from the other switchgear in the MAIN SWITCHBOARD, for all of the following, where present:

(a) water supply pumps for fire HYDRANT boosters, MAIN RISERS, COMPLIANT SPRINKLER SYSTEMS, FIRE HOSE REELS and any other electronically activated pump in the FIRE SAFETY SYSTEM

(b) air handling systems designed to exhaust and control the spread of fire and smoke

(c) EMERGENCY LIFTS, AUTOMATED doors, FIRE DOORS, and EMERGENCY EXITS

(d) control and indicating equipment for the FIRE SAFETY SYSTEM and security system

(e) sound systems and intercom systems used for emergency purposes

.6 BUILDINGS must have one MAIN SWITCH located separately or as part of the MAIN SWITCHBOARD:

(a) for each separately metered supply, or

(b) for each separately controlled supply per meter, where a meter has more than one separately controlled supply

.7 A MAIN SWITCH must:

(a) be capable of breaking the full-load CURRENT of the relevant parts of the ELECTRICAL INSTALLATION

(b) be manually operated when directly interrupting the main CIRCUIT

(c) be provided with means of remaining in the “off” or “stop” position

(d) not re-energise the relevant part of the ELECTRICAL INSTALLATION upon release of the device

(e) be capable of being reset manually

(f) not consist of plugs and socket-outlets unless a switch is provided for each

(g) be coloured red with a contrasting background and be accompanied by informative signage

.8 A MAIN SWITCH need not be located on a SWITCHBOARD, or be readily accessible, if unauthorised operation may impair safety.

.9 MAIN SWITCHES must be clear marked so that they can be accessed by EMERGENCY RESPONDERS as follows:

(a) “Main Switch” must be labelled and readily distinguishable by means of grouping, contrasting colours, or other suitable means

(b) where there is more than one MAIN SWITCH, each one must be marked to indicate the ELECTRICAL INSTALLATION that it controls

(c) prominent notice must be provided for MAIN SWITCHES that bring into operation an RENEWABLE ENERGY supply

(d) each MAIN SWITCHBOARD in a BUILDING, FACILITY and SITE must have prominent notice indicating the location of other electrical supplies and DISTRIBUTION SWITCHBOARDS on the property

.10 In a **Multiple Unit Building**, a DISTRIBUTION SWITCHBOARD must be supplied in every UNIT and/or in a common area in the BUILDING and have:

(a) ready access to an isolating switch or switches controlling supply to the UNIT, or

(b) ready access to the MAIN SWITCH or switches

G4.G Wiring Identification

.1 WIRING must be clearly identified to indicate its function as active, neutral, EARTHING or EQUIPOTENTIAL BONDING according to the colour coding system shown in Figure G4.G.1 below:

Figure G4.G.1: Colour Coding for Wiring

Fixed Cables (in, on or behind the wall)	**Single Phase** **Double Phase**	**Neutral**	**Protective earth/ ground**
Flexible Cables (extension cords, power line cords, lamp cords	**All Phases**		

G4.H Wiring Installation (General)

.1 Wiring systems must be selected and installed to minimise damage to CABLE INSULATION, sheathing, connections and components due to mechanical damage or vibration, by provision of:

(a) supports (continuous or at appropriate intervals) appropriate for the mass of the CABLE

(b) suitable fixings for the CABLE size and type to hold the CABLE firmly in position

(c) suitable connections for the CABLE size and type to reduce mechanical strain at joints and terminations

(d) adhering to the bending radius limits of CABLES when installing

(e) flexibility to accommodate movement and tension

.2 Wiring systems must be supported at appropriate intervals in the following locations:

(a) surface of a wall, or underside of a ceiling or roof

(b) space between a floor and the ground to which a person may gain entry

(c) ceiling space exceeding 0.6 m high

(d) within 2.0 m of any access to any space to which a person may gain entry

(e) below raised floors

.3 WIRING may be installed in suspended ceilings constructed of timber if sufficiently separated from potential FIRE HAZARDS and must comply with the following:

(a) WIRING in suspended ceilings is not permitted unless its installation is supported by the suspended ceiling manufacturer

(b) CABLES must be provided with additional protection against mechanical injury where there is potential contact with conductive ceiling support members

(c) WIRING must be fixed at regular intervals to prevent undue sagging

.4 Wiring systems must not be installed through any space formed between roofing material and its immediate supporting member, or wall-lining material and its immediate supporting member.

.5 Wiring systems must be protected against the effects of heat from external sources, including solar gain by any, some or all of the following:

(a) shielding

(b) placement of a sufficient distance from the source of heat

(c) selecting a system designed specifically for such use

(d) limited the CURRENT to be carried by the CABLE to reduce its operating temperature

(e) appropriate insulating material

(f) painted with a light-coloured water-based acrylic paint

.6 WIRING for plug and power sockets must:

(a) not be taken across doorways

(b) not be located behind door-swings

(c) have trailing cords and CABLES that do not cross circulation routes

.7 Wiring systems installed vertically must have CABLE supports installed every 8.0 m or less.

.8 CONDUIT for underground low voltage electrical CABLE must be orange in colour and have the following separation distance from other utilities:

(a) 100 mm in any direction, where the electrical supply CABLE is either indicated along its length or provided with mechanical protection (concrete slabs, continuous concrete pour, bricks designed for protecting electrical supply CABLES, other approved method), or

(b) 300 mm in any direction where the electrical supply CABLE is neither indicated or protected

.9 Installation of above-ground low voltage (LV) WIRING systems must achieve the following separation distances for above-ground UTILITIES:

(a) gas services - 25 mm minimum separation distance from gas services installed according to AS 5601

(b) water services - 25 mm minimum separation distance and installed according to AS/NZS 3500

(c) telecommunication services:
- (i) 50 mm minimum separation and installed in accordance with AS/ACIF S009 Installation Requirements for Customer Cabling (Wiring Rules), or
- (ii) 25 mm minimum separation if the low voltage WIRING is affixed with a suitable barrier of DURABLE insulating material or EARTHED metal, and the telecommunications CABLE is in a CONDUIT

.10 Minimum depth of cover for electrical CABLE and/or CONDUIT exterior to the BUILDING or FACILITY must be:

(a) where located beneath the ground or below any poured concrete (other than a BUILDING foundation):
- (i) 300 mm under a poured concrete slab of 75 mm minimum thickness
- (ii) 500 mm with no surface covering

(b) where located under a BUILDING or. FACILITY:
- (i) 0 mm under a poured concrete slab of 75 mm minimum thickness
- (ii) 500 mm with no surface covering

.11 Minimum depth of cover for WIRING chased in rock with a concrete enclosure is 50 mm from the ground where there is no surface covering.

G4.J Wiring Connections

.1 Connections between WIRING CABLES must avoid the possibility of loosening from vibration, alteration of materials or temperature variations through appropriate selection of connection materials that are:

(a) enclosed in a junction box, or the like, or

(b) fabricated of suitable mechanical protection, or

(c) effectively insulated to at least the equivalent of the CABLE INSULATION, or

(d) enclosed by an installation coupler complying with AS/NZS 61535

.2 Connections must **not** be made between the following types of WIRING CABLE, when in tension:

(a) parallel-webbed or insulated twisted aerial CABLES

(b) neutral-screened CABLES

(c) multi-core CABLES

(d) CONDUCTORS of different metals

.3 Where a soldered connection is used, the design must take into account the mechanical stress, creep and temperature rise under fault conditions and must not be clamped under a screw or between metal surfaces.

.4 When making a connection, the INSULATION on a CONDUCTOR must not be removed any further than is necessary to make the connection, and the connection must be insulated to at least the same degree of protection as that of the CONDUCTORS being connected.

.5 Any flexible CABLE must be installed so that undue stress on its connections because of a pull on the CABLE is alleviated by a non-CONDUCTIVE part of the BUILDING construction (for example, a pillar, post, grip, fastener, or other effective means), and not by knotting.

.6 CONDUCTORS joined or terminated by a crimp (compression) connection must be secured within a suitable FIRE-RESISTANT crimping device that:

(a) is a product acceptable to the Government of Samoa and installed according to manufacturer's specifications

(b) is not dependent upon compression of insulating material to achieve the connection

(c) prevents the spreading or escape of individual strands

(d) has a short-circuit rating suitable for the application

(e) has a long-term CURRENT-carrying capacity not less than that of the CONDUCTORS

(f) suffers no deterioration in performance when re-used

.7 Disconnected, redundant or unused CONDUCTORS must be terminated and protected at both ends in the same manner as required for LIVE CONDUCTORS.

G4.K Above-Ground Wiring Protection and Enclosures

.1 Wiring systems must be suitably protected against HAZARDS, wind, rain, and the presence of nearby UTILITIES in normal use by any, some or all of the following in an appropriate capacity:

(a) SETBACK a sufficient distance from other UTILITIES

(b) concealed within 50 mm from the surface of a wall, floor, ceiling or roof

(c) located more than 150 mm from internal wall-to-wall or wall-to-ceiling corners

(d) fixed in position within 50 mm from the face of a structural component of a wall, floor, ceiling or roof

under wall lining or roofing material by:
(i) fasteners, and/or
(ii) passing through an opening in a BUILDING ELEMENT and/or structural BUILDING MATERIAL

(e) a WIRING ENCLOSURE that is:
(i) WATER RESISTANT
(ii) has structural STABILITY
(iii) composed of suitable non-CONDUCTIVE material
(iv) maintains mechanical and electrical continuity, unless it is not required to be EARTHED
(v) ensures no loss of integrity to CABLES due to length, alignment, bends or changes in direction
(vi) terminates in such a manner so as to fully protect the enclosed CABLES

(f) RCD with a maximum rated operating CURRENT of 30 mA

.2 WIRING ENCLOSURES are required for insulated, unsheathed CABLE (unless the INSULATION for the CABLE or sheath meets COMBUSTIBLE requirements of AS/NZS 5000 series), **unless** the CABLES are installed:

(a) as AERIAL CONDUCTORS, or

(b) in an enclosed wall cavity between an accessory and a WIRING ENCLOSURE, or within 100 mm of the hole over which the accessory is mounted, or

(c) within SWITCHBOARDS, meters and similar enclosures provided that such CABLES are not exposed to touch during normal use, or

(d) as an EXTRA-LOW VOLTAGE CIRCUIT

.3 CABLES without sheathing must not be installed in WIRING ENCLOSURES where they may contact other services such as water, gas, hydraulic or communication systems.

.4 Sheathed CABLES are not required to be installed in a WIRING ENCLOSURE unless the INSULATION for the CABLE or sheath does not meet COMBUSTIBLE requirements of AS/NZS 5000 series standards. If the sheath of a CABLE has been removed, it must be installed in a WIRING ENCLOSURE.

.5 Acceptable materials for WIRING ENCLOSURES include:

(a) CONDUITS that comply with AS/NZS 2052 including:
(i) steel or other metal CONDUIT or metal tubing
(ii) flexible metal CONDUIT
(iii) rigid and flexible insulating CONDUIT
(iv) corrugated insulating CONDUIT

(b) CABLE trunking systems (with or without compound filling) that comply with AS/NZS 4296

(c) other systems that provide equivalent mechanical protection to those listed above acceptable to the Government of Samoa

.6 Any change from one type of WIRING ENCLOSURE to another must:

(a) be made at a SWITCHBOARD, or

(b) must use a suitable device providing complete protection of the CONDUCTOR INSULATION and adjoining WIRING ENCLOSURES

.7 CONDUCTORS that form part of a multiple ELECTRICAL INSTALLATION must be separated where they terminate in the same WIRING ENCLOSURE.

.8 CABLE of high voltage, LOW VOLTAGE, and EXTRA-LOW VOLTAGE CIRCUITS must **not** be enclosed in the same WIRING ENCLOSURE, however, LOW VOLTAGE and EXTRA-LOW VOLTAGE CIRCUITS may be in the same enclosure provided:

(a) the LOW VOLTAGE CABLES have double INSULATION, or

(b) all CABLES or each CONDUCTOR of a multi-core cable are sufficiently insulated to the highest voltage present

G4.L Underground Wiring

.1 In a shared underground trench, a minimum distance of 50 mm must be maintained between CONDUIT for LOW VOLTAGE WIRING, and CONDUIT for telecommunication wiring.

.2 CABLES not installed in a WIRING ENCLOSURE (see Section G4.K for requirements) must be laid on a bed of not less than 50mm depth of sand or friable soil free of sharp stones and covered by not less than 50 mm of the same material.

.3 WIRING ENCLOSURES must be constructed of appropriate materials and strength for the particular type of CABLE and/or CONDUCTOR, and comply with Table G4.L.3 below.

.4 Underground CABLES must be clearly marked prior to construction and after, with signage (in Samoan and English, or pictograms) standing a minimum of 800 mm in height and containing legible, permanent markings on NON-COMBUSTIBLE hard-surface material, in the following locations:

(a) above or adjacent to the CABLE in compliance with AS 4799 Installation of Underground Services

(b) at points of entering and leaving the SITE

(c) at changes in direction

(d) be sited every 200 m or less if the line of sight is blocked by SITEWORKS or other feature

G4.M Earthing

.1 All conductive metallic parts in a BUILDING, FACILITY or SITE must be connected to an EARTHING system and/or have an EQUIPOTENTIAL BOND (see Section G4.N) to reduce the potential for harm from electric shock and provide a safe path for the dissipation of FAULT CURRENTS, lightning strikes, static discharges, and EMI and RFI signal interferences. Metallic parts and fittings that are not exposed to electricity and are effectively isolated and/or insulated from the potential of receiving electrical CURRENT from an external source need not be bonded.

.2 BUILDINGS, FACILITIES and SITES must be protected by EARTHING from changes in voltage that may occur from any of the following sources:

(a) a FAULT external to the SITE arising from an incoming RETICULATED PLUMBING or SITE SERVICING conductive pipe

Table G4.L.3: Underground Wiring Enclosures for Cable Types

	Heavy duty conduit Medium-duty conduit encased in concrete	Heavy- duty fibre cement conduit Fibre cement conduit encased in concrete Medium-or heavy-duty galvanised pipe	Medium-duty corrugated or flexible conduit	Buried direct in the rock with no enclosure	Chased in rock with no enclosure and covered in concrete
Insulated, unsheathed CONDUCTORS	A		B		
Insulated, sheathed CONDUCTORS	A	A	B	B	
Sheathed, armoured and served cables	A	A	A	A	A
Neutral-screened cables suitable for underground	A	A	A	A	
Neutral-screened cables	A	A	B	B	
Served MIMS cables	A	A	B	B	A
Aluminium sheathed or strip armoured cables with PVC sheath	A	A	B	B	A

A - no additional protection required

B - MECHANICAL PROTECTION required, must be one of the following:

(a) precast concrete slabs having a minimum thickness of 40 mm and a classification of not less than grade 20 in accordance with AS 3600 or NZS 3104

(b) concrete slabs cast on-site having a thickness of not less than 100 mm

(c) continuous concrete pour having a thickness of not less than 75 mm

(d) fibrous cement slabs having a thickness of not less than 12 mm

(e) bricks manufactured specifically for the protection of electric CABLES

(f) polymeric CABLE cover strip complying with AS 4702

(g) other materials that provide the same degree of protection by the above

Mechanical protection must:

(a) be placed no more than 75 mm above the WIRING system

(b) be no less than 150 mm wide

(c) overlap the WIRING system by at least 40 mm on each side

(b) a FAULT arising from the supply neutral and protective EARTHING system

(c) load CURRENT in the soil passing through a swimming pool

(d) voltages from a telecommunication system that transfer to CONDUCTIVE parts

(e) lightning (direct or indirect)

.3 EARTHING of a BUILDING, FACILITY and/or SITE must ensure the safe operation of the ELECTRICAL INSTALLATION by:

(a) enabling automatic disconnection of supply in the event of a short-circuit to earth FAULT or excessive earth leakage CURRENT

(b)mitigating voltage differences between exposed conductive part of ELECTRICAL EQUIPMENT and conductive parts

(c) providing an effective and reliable low impedance FAULT path capable of carrying earth FAULT and earth leakage CURRENT without danger or failure from external influences

(d) providing measures for the connection of exposed and extraneous conductive parts

(e) not including sprinkler pipes, or pipes conveying gas, water, FLAMMABLE liquid or other conductive non-electrical utilities

.4 The following EARTHING systems must be independent from the EARTHING system for the BUILDING, FACILITY and/or SITE:

(a) lighting and static electricity protection

(b) radio frequency interference installations

(c) information technology installations

(d) explosion protection systems

(e) cathodic protection systems

.5 Where the telephone and telecommunication EARTHING system is connected with the main EARTHING system for the BUILDING, FACILITY or SITE, it must be connected:

(a) at an enclosed terminal that is:
- (i) connected by means of a PROTECTIVE EARTHING CONDUCTOR to the MAIN EARTHING CONDUCTOR
- (ii) not installed in a SWITCHBOARD
- (iii) sited in a convenient and accessible location
- (iv) have a minimum cross-section area of 6 mm^2

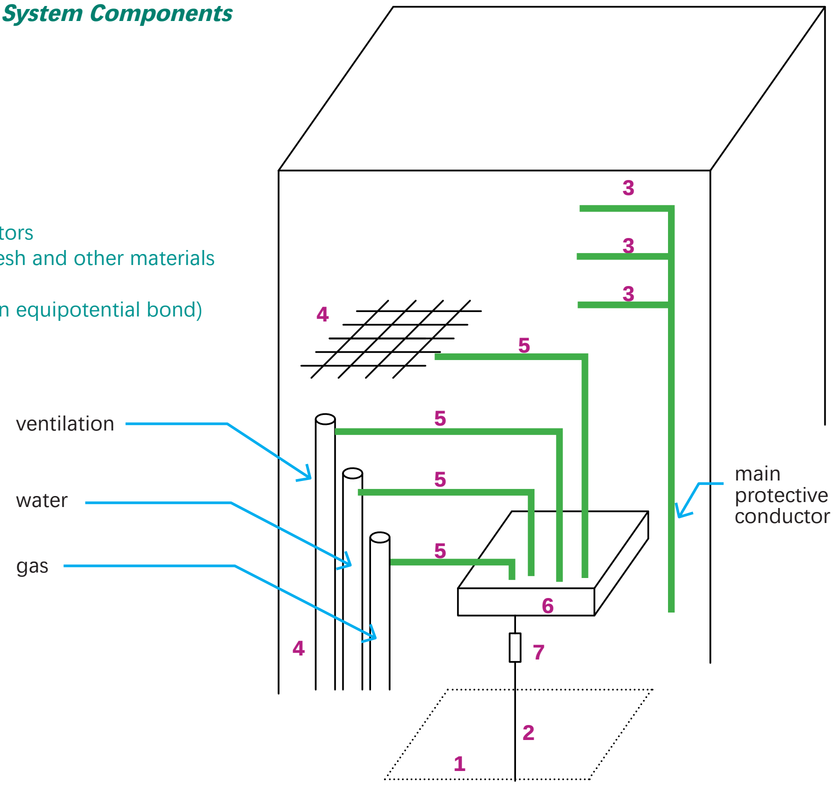
(b) directly to the EARTH ELECTRODE by an independent connecting device and must be clearly identified, and/or

(c) in compliance with AS/ACIF S009 Installation Requirements for Customer Cabling

.6 Conductive BUILDING MATERIALS must be EARTHED where:

Figure G4.M.6 Earthing System Components

1. Earth electrode
2. Main earthing conductor
3. Protective earthing conductors
4. Conductive metal pipes, mesh and other materials
5. Earthing conductors
6. Earthing terminal (acts as an equipotential bond)
7. Removable link (optional)



(a) risk of contact with LIVE parts of ELECTRICAL EQUIPMENT or insulated, unsheathed CABLES exists, or

(b) double INSULATION of CABLES in contact with structural metalwork is not provided

(c) structural metal forms the framework of a **Residential Building**

and

(d) the EARTHING system must consist of the following, an example of which is illustrated in Figure G4.M.6:
- (i) PROTECTIVE EARTHING CONDUCTORS connecting exposed conductive parts to the EARTHING terminal
- (ii) MAIN EARTHING CONDUCTOR
- (iii) main EARTHING terminal, connection or bar
- (iv) connection from the RETICULATED electrical supply to the main EARTHING terminal, connection or bar, and the supply neutral bar
- (v) EARTH ELECTRODE
- (vi) EQUIPOTENTIAL BONDING of extraneous conductive parts, and other required parts

.7 Types of conductive material in an EARTHING system must include any, some, or all of the following:

(a) a singular CONDUCTOR fabricated from either:
- (i) high conductivity copper in the form of stranded circular braided or solid CONDUCTORS with a cross-sectional area of at least 10 mm2 and a thickness of at least 1.5 mm, or
- (ii) corrosion-resistant aluminium CONDUCTORS installed above-ground and away from WET AREAS, or
- (iii) other material with the same CONDUCTOR resistance as a copper PROTECTIVE EARTHING CONDUCTOR

(b) more than one LIVE CONDUCTOR in a common protective enclosure

(c) multi-core CABLES

(d) BUSBARS

and the following in accordance with provisions described in AS/NZS 3000: 2007

(e) conductive CONDUIT, tube, pipe, trunking and similar WIRING ENCLOSURES

(f) conductive sheaths, armours and screens of CABLES

(g) conductive framework used for mounting ELECTRICAL EQUIPMENT

(h) CATENARY WIRES for the support of CABLES

.8 The MAIN EARTHING CONDUCTOR, PROTECTIVE EARTHING CONDUCTORS and any other parts that carry an earth FAULT CURRENT must be capable of carrying that CURRENT without attaining excessive temperature, and must comply with AS/NZS 3000: 2007.

.9 PROTECTIVE EARTHING CONDUCTORS must be provided with appropriate INSULATION, except for:

(a) AERIAL CONDUCTORS

(b) flat braided CONDUCTORS

(c) BUSBARS

(d) sheaths of MIMS (Mineral Insulated Metal Sheathed) CABLE

(e) CONDUCTIVE framework and WIRING ENCLOSURES deemed to be a PROTECTIVE EARTHING CONDUCTOR

(f) copper PROTECTIVE EARTHING CONDUCTORS buried direct in the ground

(g) CATENARY WIRES

.10 EARTH ELECTRODES must be installed:

(a) in a suitable location that:
- (i) maintains contact with moist soil that is not subject to excessive drying out
- (ii) is separated from conductive enclosures of other buried PLUMBING and UTILITIES
- (iii) is easily accessed for maintenance and replacement

(b) at a minimum depth of 1.8 m for vertical-type EARTH ELECTRODES

(c) in a horizontal trench laid at a depth with a minimum cover of 0.5 m and a minimum horizontal length of 7.5 m for strip-type EARTH ELECTRODES

(d) in multiple locations for BUILDINGS and FACILITIES in BUILDING GROUP 1-3 at a frequency appropriate to the size of the structure,

(e) no closer than at least a 1.0 m SETBACK from the sphere of influence around each EARTH ELECTRODE

(f) in accordance with approved testing procedures for soil resistance in compliance with the requirements of the Electrical Power Corporation (EPC)

.11 An EARTH ELECTRODE must be made of highly conductive / low resistance material such as steel or copper, and contain the following three components:

(a) ground CONDUCTOR

(b) connection between the ground CONDUCTOR and the ground electrode

(c) ground electrode, the size and material in compliance with AS/NZS 3000: 2007

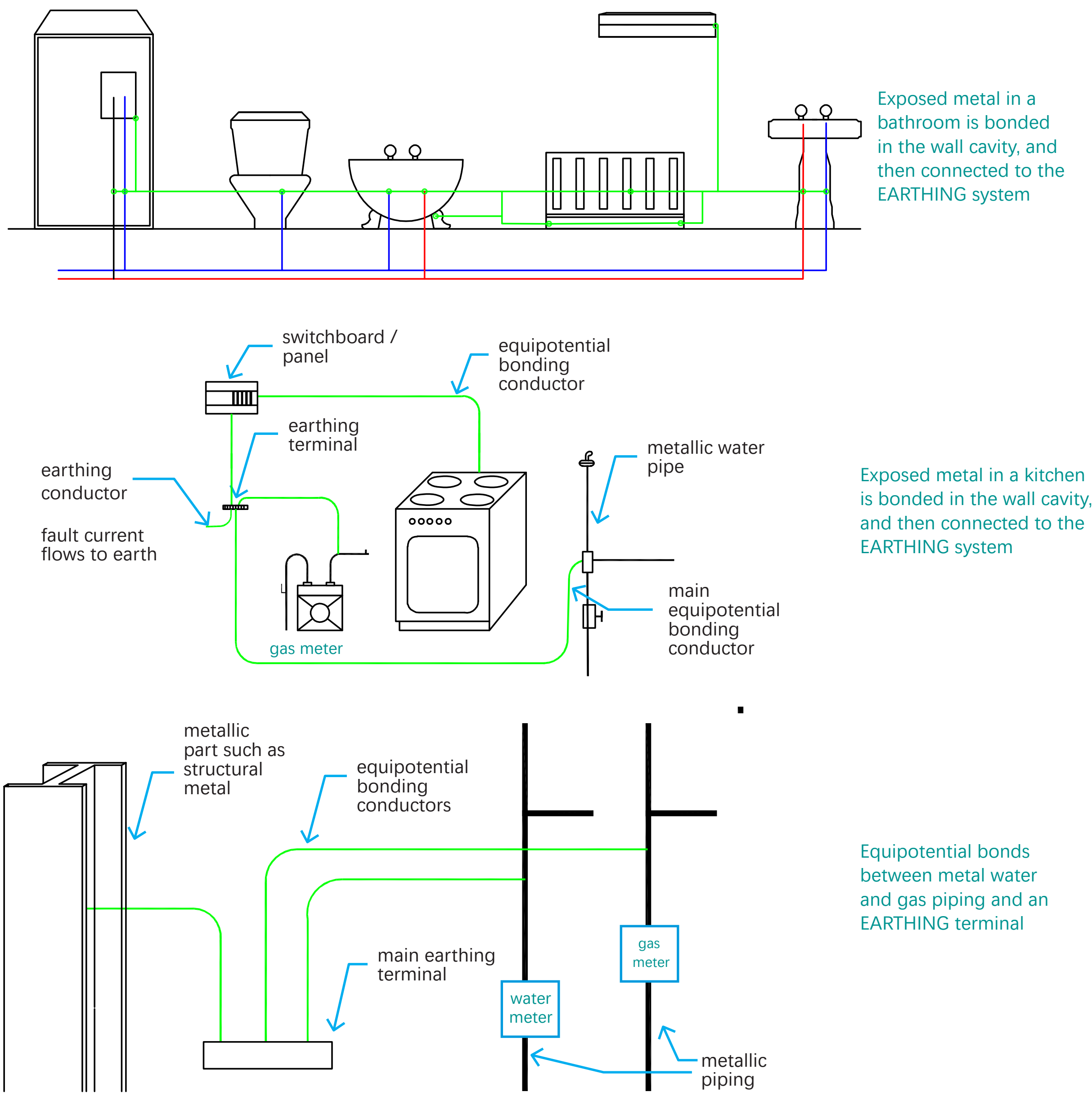
G4.N Equipotential Bonding

.1 EQUIPOTENTIAL BONDING must be used to separate conductive sheath, armour or WIRING ENCLOSURE operating at above EXTRA-LOW VOLTAGE where in close proximity to conductive pipes containing flammable agents such as gas or oil, unless one of the following is provided:

(a) rigid separation spacing of 25 mm in air, or

(b) DURABLE insulating material with a minimum thickness of 6 mm

Figure G4.N.2: Examples of Equipotential Bonding



.2 EQUIPOTENTIAL BONDING must be used to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, in kitchens, BATHROOMS, and wherever a difference in voltage or frequency could occur, for the following:

(a) water supply, gas, and other metal pipes, and ducting that enter the EXTERNAL WALL of the BUILDING or FACILITY, or are located internal to the structure, as shown in the example in Figure G4.N.2

(b) metal central air conditioning systems

(c) exposed metal structural parts of the BUILDING

(d) lightning protection systems

.3 EQUIPOTENTIAL BONDING CONDUCTORS must **not** carry CURRENT in typical use of the BUILDING, FACILITY or SITE.

.4 EQUIPOTENTIAL BONDING must be provided for conductive piping associated with fire sprinklers, gas, water or FLAMMABLE liquid that are in contact with exposed conductive parts of wiring enclosures, CABLE components or other ELECTRICAL EQUIPMENT, except where the piping is effectively EARTHED, (see Section G4.M above).

.5 EQUIPOTENTIAL BONDING in a BUILDING, FACILITY or SITE must comply with the following standards:

(a) patient areas of hospitals, medical and dental practices, must comply with AS/NZS 3000

(b) explosive atmosphere locations must comply with AS/NZS 2381 and AS/NZS 61241

(c) telecommunications installations must comply with AS/NZS3015

(d) film, video and television sites must comply with AS/NZS 4249

(e) photovoltaic arrays must comply with AS/NZS 5033

(f) elevated, general access floors must comply with AS 4154

G4.O Electrical Equipment for Wet Areas and Swimming Pools

.1 WET AREAS (including indoor BATHROOMS, showers, laundries, spas, hot tubs, food preparation areas) and swimming pools (including hot tubs and spas) must be protected from the possibility of electric shock by:

(a) adhering to the appropriate SETBACKS and IPX standards shown in Table G4.O.1 for outlets, switches, lighting, and other ELECTRICAL EQUIPMENT

(b) use of appropriate WATERPROOF material and equipment

(c) protecting ELECTRICAL EQUIPMENT, CIRCUITRY, and SWITCHBOARDS from water penetration

(d) connecting all exposed conductive metals to EARTHING through EQUIPOTENTIAL BONDING

.2 Sockets and outlets must **not** be installed within 0.3 m of the floor of a WET AREA or swimming pool, regardless of the degree of protection of the socket or outlet.

Table G4.O.1: Electrical Installation Protection in Wet Areas

	Zone 0 *water immersion area (min. IPX7)*	**Zone 1** *1.2 lineal m from Zone 0 , and max. 2.4 m ht. floor to ceiling*	**Zone 2** *0.6 lineal m from Zone 1, and max. 2.4 m ht. floor to ceiling*	**Zone 3** *2.4 lineal m from Zone 2, and max. 2.4 m ht. floor to ceiling*
Socket-outlets	Not permitted	Not permitted	• shaver-outlet with automatic switching (AS/NZS 3194), or • RCD (with fixed rate RESIDUAL CURRENT 30 mA max.) enclosed in a WATER RESISTANT cupboard	• RCD (with fixed rate RESIDUAL CURRENT 30 mA), or • supplied on a separate CIRCUIT, or • supplied as a SELV or PELV system
Switches / Accessories	Not Permitted	• 0.3 m minimum distance from wet surface area (floor, sink, bath, shower, spa) • protected to a minimum of IPX4		• 0.3 m minimum distance from wet surface area (floor, bath, sink, shower, spa)
Luminaires	• IPX7 required and must be designed for WET AREA use • nominal voltage not exceeding 12 V a.c., or 30 V ripple-free d.c. • SELV or PELV system from outside of Zone 0	• IPX4 required • IPX5 for communal bath/showers	• IPX 4, or IPX5 for communal bath/ showers, or • double or reinforced INSULATION, or • SELV or PELV recessed in ceiling	• no IP rating
Other	• IPX7 required and must be designed for WET AREA use • nominal voltage not exceeding 12 V a.c., or 30 V ripple-free d.c. • SELV or PELV system from outside of Zone 0	• IPX4 required • IPX5 for communal bath/showers	• IPX4 or recessed in ceiling • IPX5 for communal bath/shower or recessed into ceiling	• no IP rating
		• heating cable systems in the floor and suitably protected are permitted		
Switch-boards	Not permitted	Not permitted	Not permitted	Not permitted

Note:

Zone 0 includes: enclosed showers, floors of open showers, baths, sinks in BATHROOMS, sinks in food preparation areas, hot tubs and spas < 500 L capacity, laundry sinks, washing machines, and any other equipment designed to retain water deemed appropriate by the Government of Samoa

***RCD** - RESIDUAL CURRENT DEVICE - a device intended to disconnect supply to protected CIRCUITS, socket-outlets or ELECTRICAL EQUIPMENT in the event of a leakage CURRENT flow that exceeds a predetermined value*

***Ripple-free d.c** - a ripple CURRENT not exceeding 10% r.m.s. where maximum peak value does not exceed 140 V for a nominal 120 V ripple-free d.c. system, and 70 V for a nominal 60 V ripple-free d.c. system*

***PELV** - **Protected Extra-Low Voltage** - an extra-low voltage system not electrically separated from earth, but that otherwise satisfies all requirements for SELV*

***SELV** - Separated Extra-Low Voltage - an extra-low voltage system that is electrically separated from earth and other systems in such a way that a single FAULT cannot give rise to the risk of electric shock*

IPX3 *- weatherproof socket, outlet or switch that can withstand vertically dripping water (example - IP53)*

IPX4 *- weatherproof socket, outlet or switch with 100% protection of enclosure (example - IP54)*

IPX5 *- weatherproof socket with a spring latched cover over the plugging (example - IP55)*

IPX6 *- weatherproof, can withstand strong jets of water (fire hose) from all directions (example - IP66)*

IPX7 *– allows temporary immersion in water to a depth between 15 cm and 1 m (example - IP67)*

IPX8 *- rating allows for continuous immersion under significant pressure – pool lights (example - IP68)*

To interpret the Table, diagrams found in AS/NZS 3000: 2007 provide dimensions of Zones 0 - 3 that must be used to determine extent of zones.

.3 WIRING and CABLE must be installed to prevent entry of moisture at connections and water siphoning through any WIRING ENCLOSURE in a WET AREA or within 3.0 m of a swimming pool.

.4 EQUIPOTENTIAL BONDING for WET AREAS and swimming pools must be:

(a) accessible for monitoring and maintenance purposes

(b) protected against mechanical damage and corrosion

(c) provide appropriate level of electrical conductivity

(d) be installed according to the manufacturer's specifications

.5 Electrical safety for swimming pools must be ensured by:

(a) EQUIPOTENTIAL BONDING of all metal work within 3.5 m of the swimming pool, hot tub or spa, including ladders, diving boards, piping, fencing, permanently attached metal seating, lighting standards, and connected to an EARTHING system separate from the BUILDING or FACILITY

(b) providing a protected safety switch connected to all ELECTRICAL EQUIPMENT

(c) protecting ELECTRICAL EQUIPMENT from water penetration by one, some or all of the following:
- (i) protective and WATERPROOF covers
- (ii) locating equipment where it cannot come into contact with, fall or slide into water
- (iii) WATERPROOF equipment room

(d) IPX-rated sockets / outlets and switches appropriate to the distance from the pool, hot tub or spa as shown in Table G4.O.2

(e) IPX-rated luminaires designed specifically for pools, hot tubs and spas appropriate to the distance from the standing water

(f) submersible pumps and lighting using EXTRA LOW VOLTAGE and designed specifically for swimming pool, hot tub or spa usage

.6 Where ELECTRICAL EQUIPMENT is in contact with pool water, protective measures must include any, some, or all of the following:

(a) locating the ELECTRICAL EQUIPMENT at a safe distance from the pool with all PLUMBING connections made of non-conductive materials

(b) metal grids or barriers inserted in any PLUMBING connections between the ELECTRICAL EQUIPMENT and pool and connected to the EQUIPOTENTIAL BONDING system

(c) use of RCD with a fixed rated residual CURRENT not exceeding 30 mA to protect CIRCUITS supplying Class 1 (EARTHED conductive parts) equipment

Table G4.O.2: Electrical Equipment Protection for Swimming Pools

	Zone 0 ***water immersion area***	**Zone 1** ***2.0 lineal m from Zone 0 , and 2.5m height***	**Zone 2** ***1.5 lineal m from Zone 1, and 2.5m in height***
Socket-outlets	Not permitted	**Type**: pool equipment use only **Waterproof Protection**: IPX5 **Location:** • Either 0.45 m minimum from ground and 1.25 m minimum from pool edge, or • 0.5 m minimum under the edge of a fixed continuous barrier greater than 1.45 m wide **System Type Options:** • separated • SELV or PELV supply • RCD	**Type**: pool equipment use and general use **Waterproof Protection**: IPX4 **System Type Options:** • separated • SELV or PELV supply • RCD
Switches / Accessories	Not Permitted	**Waterproof Protection**: IPX5	**Waterproof Protection**: IPX4
Luminaires / Appliances / Other Equipment	**Type**: • must be specifically designed for pools, hot tubs, spas • must not have EARTHING cover **Waterproof Protection**: IPX8 **Voltage:** 12 V a.c. and/or 30 V d.c. **System Type Options:** • SELV or PELV supply from an outside source • RCD	**Waterproof Protection**: IPX5 **System Type Options:** • SELV or PELV supply from an outside source • Class II Construction (double or reinforced INSULATION) • Class I Construction (EARTHED conductive parts) fixed in position and with RCD protection	**Waterproof Protection**: IPX4 **System Type Options:** • SELV or PELV supply • separated supply • Class II Construction (double or reinforced INSULATION) • Class I Construction (EARTHED conductive parts) fixed in position and with RCD protection
Switch-boards	Not permitted	Not permitted	Not permitted

Note:
- *Zone 1 includes 1.5 m horizontal distance around a diving board, spring board, diving block or slide*
- *Spa pools attached to a swimming pool are considered to be an extension to the swimming pool*
- *Spa pools greater than 5,000 L in capacity have the same zones as a swimming pool*
- *Spa pools from 500 to 5000 L in capacity have Zone 0 as the area inside the spa pool and Zone 1 as an area 2.5 m from the edge of the spa horizontally and 1.25 m in height*
- *Spa pools less than 500 L capacity will have the same requirements as a bath in a WET AREA*

IPX3 *- weatherproof socket, outlet or switch that can withstand vertically dripping water (example - IP53)*
IPX4 *- weatherproof socket, outlet or switch with 100% protection of enclosure (example - IP54)*
IPX5 *- weatherproof socket with a spring latched cover over the plugging (example - IP55)*
IPX6 *- weatherproof, can withstand strong jets of water (fire hose) from all directions (example - IP66)*
IPX7 *– allows temporary immersion in water to a depth between 15 cm and 1 m (example - IP67)*
IPX8 *- rating allows for continuous immersion under significant pressure – pool lights (example - IP68)*

To interpret the Table, diagrams found in AS/NZS 3000: 2007 provide dimensions of Zones 0 - 3 that must be used to determine extent of zones.

G4.P Lightning Protection System

.1 Lightning protection for BUILDINGS, FACILITIES and SITES must provide a point of contact for a lightning stroke (lightning rod or air terminals), then have equipment to safely conduct the lightning CURRENT to the ground while minimising the potential of side-flash and magnetic induction to other CONDUCTIVE material in the structure.

.2 Internal CABLES, ELECTRICAL EQUIPMENT, SWITCHBOARDS and switches used by EMERGENCY RESPONDERS must be separated from the lightning protection system to protect them from the elevated electromagnetic field generated by lightning rods, air terminals, down-CONDUCTORS and EARTHING systems during lightning strikes.

.3 Metallic CONDUCTIVE objects such as architectural features, flagpoles, metal railings, metal fences, steel plant surrounds,and roof access ladders may be used as air terminals to protect a planar roof surface as part of the overall lightning protection plan.

.4 The lightning protection system for a BUILDING, FACILITY and/or SITE must have the following (see Figure G4.P.4):

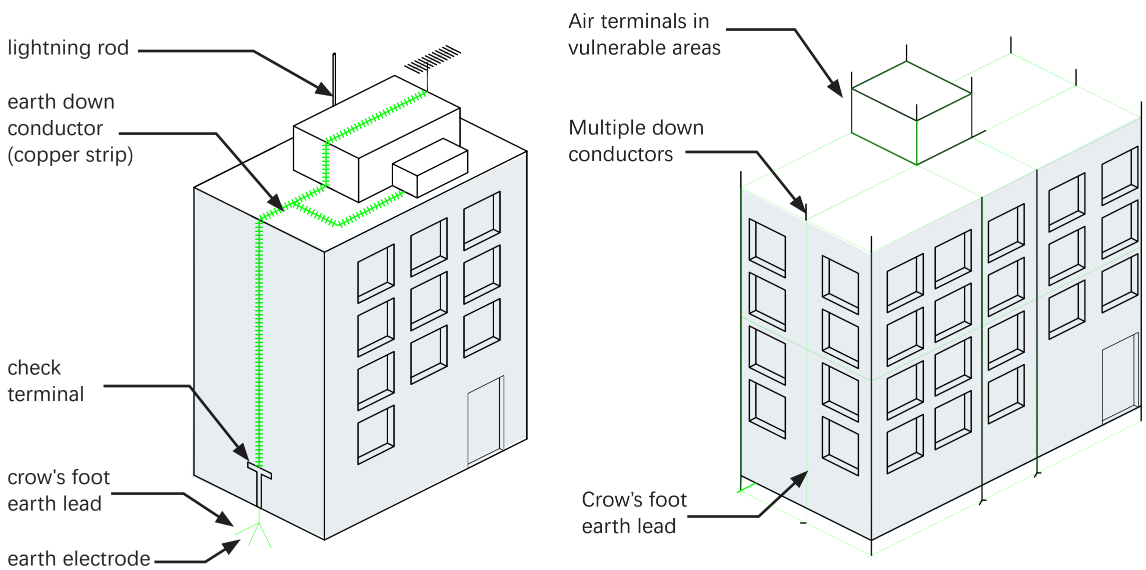
(a) lightning capture device (lightning rod) and/or a series of air terminals connected together

(b) single or multiple down-CONDUCTORS designed to convey the lightning CURRENT to earth

(c) “crow’s foot” earth leads connected together at the terminus of each down CONDUCTOR

(d) EQUIPOTENTIAL BONDING (see Section G4.N above) between all metallic frames and the earth leads

Figure G4.P.4: Lightning Protection System Examples



.5 During construction, structural rebar within the concrete may be used to carry lightning CURRENT to the ground where continuity of rebar from roof to ground is clearly demonstrated.

.6 A lightning rod and air terminals must be placed to protect the most vulnerable parts of the roof (points and corners) of the BUILDING and/or FACILITY and at or close to the highest point, and should have the following characteristics:

(a) a minimum length above the roof of 0.5 m and placed within 1.0 m of the part it is to protect if it is installed vertically

(b) If the air terminal is a strip CONDUCTOR, it must be directly located on the part it is to protect

(c) achieve the recommended interception efficiency according to the RSM (Rolling Sphere Method) specified in AS/NZS 1768: 2007, as amended

(d) connected to one or more down-CONDUCTORS

.7 Down-CONDUCTORS must be located:

(a) on the exterior of the EXTERNAL WALLS of the BUILDING and/or FACILITY, or

(b) within the cavity of EXTERNAL WALLS in a non-conductive, NON-COMBUSTIBLE duct, but only when external routes for down-CONDUCTORS are impracticable or inadvisable

.8 The number of down-CONDUCTORS must be appropriate to the desired level of protection for the type and occupancy of the BUILDING, FACILITY or SITE, and in all cases must be placed no further than 20 m apart.

.9 At least one termination must be installed at the end of each down-CONDUCTOR.

.10 Alternative systems, such as the ERITECH System 3000, that differ from AS/NZS 1768: 2007 may be used providing they achieve the same performance level for health and safety of people and the environment.

G4.Q Refrigeration Room

.1 ELECTRICAL EQUIPMENT permitted within a REFRIGERATION ROOM must have an IP degree of protection of at least IPX4B or IP24.

.2 Wiring selected for the supply, control and protection of ELECTRICAL EQUIPMENT within a REFRIGERATION ROOM must:

(a) not be affected by the operating temperature of the room

(b) not provide pockets or channels in which moisture might accumulate

(c) be designed for use in a REFRIGERATION ROOM or associated with the ELECTRICAL EQUIPMENT for a REFRIGERATION ROOM

.3 Permitted WIRING types include:

(a) unenclosed sheathed CABLES including served MIMS CABLES

(b) insulated, unsheathed or sheathed CABLES enclosed in a WIRING ENCLOSURE with adequate drainage

(c) other WIRING systems that can achieve the performance levels demonstrated in (a) and (b) above

(d) but not PVC insulated, unsheathed or sheathed CABLES not in a WIRING ENCLOSURE that would be subject to bending, flexing or vibration at low temperatures

.4 A WATER RESISTANT sealant that does not set hard must be provided:

(a) for each WIRING ENCLOSURE where the WIRING passes from a refrigerated to a non-refrigerated space

(b) at the point of entry of CABLES into motors, luminaires, switches or other ELECTRICAL EQUIPMENT

.5 Fixed electrical appliances must provide a degree of protection suitable for the conditions in a REFRIGERATION ROOM such as the provision of internal heaters or an enclosure that would prevent the retention of moisture.

.6 Any heating element in a REFRIGERATION ROOM door seal must be provided with an RCD outlet with a fixed rated residual CURRENT not exceeding 30 mA.

.7 A SWITCHBOARD is not permitted in a REFRIGERATION ROOM.

G4.R Aerial Conductors

.1 Appropriate material for AERIAL CONDUCTORS is any, some, or all of the following:

(a) hard-drawn bare CONDUCTORS

(b) polymeric insulated CABLES

(c) neutral-screened CABLES

(d) parallel-webbed, twisted, or bundled insulated CABLES

.2 AERIAL CONDUCTORS must be insulated where:

(a) the CONDUCTOR is attached to a BUILDING and/or FACILITY

(b) the CONDUCTOR is within arms reach of any BUILDING and/or FACILITY

(c) in bushfire-prone areas

(d) above areas where sailing craft or irrigation pipes are used

.3 AERIAL CONDUCTORS may not be installed over a swimming pool, hot tub, spa or other recreational body of water, and must be installed a minimum of 5.0 m from any existing tree trunks.

.4 Connections to AERIAL CONDUCTORS must be reliable and adequately protected against the effects of movement, exposure to direct sunlight, and water penetration.

.5 AERIAL CONDUCTORS must be identified immediately adjacent to their termination by the letter “E” or by the universal symbol for EARTHING.

.6 Suitable devices or notices warning people about the presence of AERIAL CONDUCTORS must be erected in locations where such CONDUCTORS are erected:

(a) above areas used by sailing craft

(b) where long lengths of CONDUCTIVE piping, such as for irrigation, may reasonably be expected to be raised or handled

(c) where loading or unloading of vehicles is likely to occur

(d) in other locations where the risk of inadvertent contact with AERIAL CONDUCTORS is anticipated.

(d) where AERIAL CONDUCTORS cross a waterway

(f) where AERIAL CONDUCTORS are located in the vicinity of an aerodrome, airport or landing strip

.7 Minimum clearances for AERIAL CONDUCTORS from BUILDINGS, FACILITIES and conductive materials located outdoors are shown in Table G4.R.7 below, and must satisfy the following provisions:

Table G4.R.7: Minimum Safety Clearances for Aerial Conductors
(ALL DIMENSIONS ARE IN METRES)

Aerial Conductor Type	*Minimum height above buildings, structures, ground or elevated areas*					
	Over areas used by vehicles	*Over areas not used by vehicles*	*Over roofs used for traffic or resort*	*Over other roofs and structures*	*Over swimming pools, hot tubs, spas, recreational body of water*	*Above areas used by sailing craft or irrigation pipes*
Bare LIVE conductors	5.5	5.0	3.7	3.0	not permitted	not permitted
Insulated and unsheathed LIVE conductors	4.5	3.0	3.0	2.0	3.0	5.5
Neutral-screened CABLE	4.6	3.0	2.7	0.5	3.0	4.5

Aerial Conductor Type	*Minimum height from a conductive outdoor element*	
	From clothes lines, radio and television aerials, counterpoise or stay wires	*From telecommunications lines and in accordance with AS/ACIF S009*
Bare LIVE conductors	2.0	2.0
Insulated and unsheathed LIVE conductors	1.0	2.0
Neutral-screened CABLE	1.0	2.0

Note:

1. *When erecting AERIAL CONDUCTORS, an allowance for sag and sway under normal operating conditions must be added to ensure that clearances are maintained.*
2. *Further information regarding required clearances for crossing telecommunication lines is contain in AS/ACIF S009.*
3. *Warning notices shall be erected in locations listed in Section G4.R.6.*
4. *Increased distances may be required over public roadways.*

(a) clearances must be maintained in any direction and from any position to which any part of the AERIAL CONDUCTOR may sag or move as a result of wind pressure

(b) additional clearances greater than that shown in Table G4.R.8 must be provided to ensure the minimum clearances can be maintained up to a maximum CONDUCTOR temperature of 115°C

(c) suitable clearance to prevent contact of an AERIAL CONDUCTOR with a BUILDING or structure must be installed where AERIAL CONDUCTORS terminate above or to the side of a BUILDING

.8 The size and maximum span of AERIAL CONDUCTORS must comply with Table G4.R.9, unless detailed engineering studies demonstrate that a greater span can be installed and maintain the safety standards associated with the spans in Table G4.R.8:

.9 Supports for AERIAL CONDUCTORS must be insulators or purpose-designed fittings suitable for the type of CABLE with which they are to be used.

Table G4.Q.8 Maximum Size and San for Aerial Conductors

Aerial Conductor Type	*Size (mm^2)*	*Maximum span (m)*
Insulated annealed copper including neutral-screened	≥ 6	20
Bare hard-drawn copper	≥ 6	60
Insulated hard-drawn copper including two-, three- and four-core twisted but excluding neutral -screened	6 10 ≥ 16	40 50 60
Neutral-screened CABLES with hard-drawn copper conductors		
Two conductors	6 or 10	40
Three conductors	6 or 10	60
Four conductors	6 or 10	50
Two, three or four conductors	16	60
Insulated or bare aluminium excluding neutral-screened	16 ≥ 25	50 60
Aerial bundled CABLES (aluminium conductor)	≥ 25	60

.10 Any joints and connections, and hardware or fittings used to secure AERIAL CONDUCTORS must be of corrosion-resistant material and must comply with Section G4.J Wiring Connections, above.

.11 Size, depth into soil, and material for support poles must be in compliance with Appendix D Minimum Size of Poles and Struts for Aerial Line Conductors in AS/NZS 3000: 2007.

.12 CONDUCTORS must be adequately spaced to prevent contact with each other under all conditions of swag and sway, and comply with the minimum spacing shown in Table G4.QR.12 below.

Table G4.R.12 Minimum Spacing between Aerial Conductors at Supports

Span	Spacing (m)	
	Insulated Conductors	Bare Conductors
≤ 10	0.2	0.4
> 10 to ≤ 25	0.3	0.5
> 25 to ≤ 45	0.4	0.6
> 45 to ≤ 60	0.5	0.7

ACCEPTABLE SOLUTIONS

AS/NZS 2381: 2008 Electrical Equipment for Explosive Atmospheres - Selection, Installation and Maintenance
AS/NZS 3000: 2007 Electrical Installations - Buildings, Structures and Premises (known as the SAA Wiring Rules)
AS/NZS 3001: 2008 Electrical Installations - Transportable Structures and Vehicles Including Their Site Supplies
AS/NZS 3002: 2008 Electrical Installations - Shows and Carnivals
AS/NZS 3003: 2011 Electrical Installations - Patient Areas
AS/NZS 3004.1 and .2: 2008 Electrical Installations - Marinas and Recreational Boats
AS/NZS 3008.1.1: 2009 Electrical Installations - Selection of Cables
AS/NZS 3012: 2010 Electrical Installations - Construction and Demolition Sites
AS/NZS 3013: 2005 Electrical Installations - Classification of Fire - Mechanical Performance of Wiring System Elements
AS/NZS 3017: 2007 Electrical Installations - Verification Guidelines
AS/NZS 3019: 2007 Electrical Installations - Periodic Verification
AS/NZS 3100: 2009 Approval and Test Specification: General Requirements for Electrical Equipment
AS/NZS 3112: 2011 Approval and Test Specification: Plugs and Socket Outlets
AS/NZS 3136: 2001 Approval and Test Specification – Electrical Equipment for Spa and Swimming Pools
AS/NZS 3191: 2009 Electrical Flexible Cords
AS/NZS 3760: 2010 In-Service Safety Inspection and Testing of Electrical Equipment
AS/NZS 5000.2: 2005 Electrical Cables - Polymeric Insulated - for working voltages up to and including 0.6/1 (1.2) kV
AS/NZS 5000.2: 2006 Electrical Cables - Polymeric Insulated Part 2 - for working voltages up to + including 450/750
AS/NZS 60227.5: 2003 Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750 V - Flexible Cables
AS/NZS 60335.2.60: 2006 Household and Similar Electrical Appliances – Safety – Particular Requirement for Whirlpool Baths
AS/NZS 61558.2.6: 2009 Safety of Power Transformers, Power Supplies, Reactors and Similar Products for Supply Voltages up to 1 100 V - Particular Requirements for Safety Isolating Transformers and Power Supply Units
AS 5102.1: 2009 Performance of Household Electrical Appliances – Swimming Pool Pump-Units – Energy Consumption and Performance
AS 5102.2: 2009 Performance of Household Electrical Appliances – Swimming Pool Pump-Units – Energy Labelling and Minimum Energy Performance Standard Requirements
AS 60529: 2004 Degrees of Protection Provided by Enclosures (IP Code)

NZECP 34: 2001 Electrical Safety Distances
NZEPC 36: 1993 Harmonic Levels
NZEPC 51: 2004 Homeowner/Occupier's Electrical Wiring Work in Domestic Installations

Solar Heaters and Collectors
AS 2369 (R2013): 1990 Materials for Solar Collectors for Swimming Pool Heating Series
AS 3634: 1989 (R2013) Solar Heating Systems for Swimming Pools

AS/NZS 2535.1: 2007 Test Methods for Solar Collectors – of Glazed Liquid Heating Collectors Including Pressure Drop (ISO 9806-1:1994, MOD)

Lighting for Public Pools and Spas
AS 2560.2.5: 2007 Sports Lighting – Specific Applications – Swimming pools
AS 2560.1: 2002 Sport Lighting – General Principles
AS 4282: 1997 Control for the Obtrusive Effects of Outdoor Lighting

AS/NZS 60598.2.5: 2002 Luminaries – Particular Requirements – Floodlights (IEC 60598.2.5:1998, MOD)
AS/NZS 60598.1: 2003 Luminaries – General Requirements and Tests.
AS/NZS 60598.2.18: 1998 Luminaries – Particular Requirements – Luminaries for Swimming Pools and Similar Applications
AS/NZS 60598.2.18: 1998

Lightning
AS/NZS 1768: 2007 Lightning Protection

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with list of ACCEPTABLE SOLUTIONS
- Specifications and/or PRODUCT INFORMATION SHEETS for all ELECTRICAL EQUIPMENT
- Electrical plan illustrating supply, connections, materials, voltage, safety features and construction details

G5 Fuel Supply

REQUIRED PERFORMANCE

THIS SECTION MUST BE READ ALONG WITH SECTION C1.A PREVENTION OF FIRE OCCURRING - ELECTRICAL WORK, AND SECTION F2.C HAZARDOUS SUBSTANCES -USE, DISPENSING AND HANDLING

.1 Design, installation, maintenance, alteration and inspection of mechanical systems operating with fuel gas must comply with AS/NZS 5601.1: 2010 Gas Installations. Fuel other than fuel gas must comply with the International Mechanical Code or an approved equivalent.

.2 A FUEL SUPPLY system must have proper installation, combustion, venting and connections to piping systems.

.3 FUEL SUPPLY systems (source and piping) must have the following safety measures:

(a) be AIRTIGHT and free of leaks

(b) be operated at a safe pressure appropriate to the use

(c) have isolation devices that separate the end-use (appliances) and piping systems from the source to facilitate easy maintenance, testing, leak detection or repair

(d) have safety controls that prevent their operation in the event of failure of forced ventilation systems or natural draft systems

.3 Fuel gas appliances, equipment and delivery systems that need not comply with Section G5.3 above include:

(a) portable FUEL GAS CYLINDERS and equipment not connected to fixed FUEL SUPPLY system

(b) installation of farm appliances and equipment such as brooders, dehydrators, dryers and irrigation equipment

(c) industrial gas applications using gases such as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen and nitrogen

(d) LP-gas equipment for vaporisation, gas mixing and gas manufacturing

(e) temporary LP-gas piping for BUILDINGS under construction or renovation that is not to become part of the permanent piping system

(f) installation of hydrogen gas, LP-gas and compressed natural gas (CNG) systems on vehicles

(g) portable FUEL CELL appliances that do not connect to a fixed piping system nor to a power grid

.4 When a naked flame is in the vicinity of an exposed gas pipe, a minimum separation distance of 600 mm must be maintained from the gas pipe to the flame.

DEEMED-TO-SATISFY PROVISIONS

G5.A Compliance

.1 All FUEL SUPPLY systems, appliances, gaseous hydrogen systems and related accessories must comply with the International Fuel Gas Code 2012 as amended,

exceptions:
(a) **Single Unit Residential, Communal Residential,** and **Multiple Unit Residential** not more than three stories high with separate means of egress and their accessory structures must comply with the International Residential Code regarding FUEL SUPPLY systems.

G5.B Incinerator Rooms

.1 If an incinerator is installed in a BUILDING or FACILITY, any opening providing access to a charging chute must be:

(a) NON-COMBUSTIBLE

(b) AIRTIGHT when closed

(c) designed to return to the closed position after use

(d) not attached to a chute that connects directly to a flue unless the hopper is located in open air

(e) not located in an EVACUATION ROUTE or EMERGENCY EXIT

.2 A room containing an incinerator must be separated from the other rooms in the BUILDING or FACILITY unless it is in a self-contained UNIT, and must be constructed with FIRE-RESISTANT walls, ceilings and floors according to Section C of the NBC.

G5.C Fuel Tanks and Fuel Gas Cylinders

.1 Use and handling of FUEL GAS CYLINDERS and fuel storage tanks must comply with:

(a) Section E Hazardous Substances of the NBC

(b) BOC Guidelines for Gas Cylinder Safety-AU435_82369, as amended

(c) Contamination Control Guidelines published by PUMA

.2 Fuel storage tanks and facilities must be constructed, operated, maintained and disposed of to prevent harm to people and the environment by:

(a) choosing a location on site not prone to NATURAL DISASTERS, FLOODING, or near a source of fire

(b) ensuring tanks are AIRTIGHT and WEATHERTIGHT to prevent leakage

(c) being equipped with devices that prevent spills and overfills, and graded so that if a spill occurs it will be properly contained and not become a HAZARD to the site, people or the environment

(d) preparation of a manual outlining correct tank-filling practices by qualified persons

(e) constructing a solid foundation for fuel storage tanks that complies with Section B Stability of the NBC

.3 Storage of FUEL GAS CYLINDERS on a non-residential SITE must:

(a) be inside an enclosure located outside the BUILDING or FACILITY where deemed necessary by the Government of Samoa (see Section G5.C.4 below)

(b) comply with the ventilation requirements of AS/NZS 1596

.4 An enclosure for FUEL GAS CYLINDERS must:

(a) be located 3 m or more from any window, door, vent or other opening in a BUILDING or FACILITY

(b) have a concrete base, and surrounding land that provides positive drainage (2% slope) away from the enclosure so that water does not accumulate

(c) be constructed from heavy-gauge chain-wire mesh or other suitable NON-COMBUSTIBLE material

(d) be at least 1.8 m high

(e) be sufficiently ventilated according to AS/NZS 1596

(f) have a hinged, heavy-gauge chain-wire door that is secure against unauthorised entry and is NON-COMBUSTIBLE

(g) have its roof at least 600 mm above the uppermost fitting on any FUEL GAS CYLINDER

(h) ensure FUEL GAS CYLINDERS are contained in a compartment separated by FIRE-RESISTING construction from other pressurised cylinders such as oxygen tanks

(i) comply with Section B2 Siteworks of the NBC regarding STORMWATER MANAGEMENT and slope stability

(j) have DURABILITY complying with Section B1 of the NBC to support the use

.5 Storage of FUEL GAS CYLINDERS on a residential SITE, or within a UNIT of a residential BUILDING or FACILITY, or within a BUILDING or FACILITY deemed appropriate by the Government of Samoa, must:

(a) be within a well-ventilated area

(b) be sufficiently removed from sources of ignition, except where the FUEL GAS CYLINDER is part of an appliance in a domestic kitchen

(c) be in a WATERPROOF location

(d) be located at least 5 m away from stairways, elevators, ramps and any part of an EVACUATION ROUTE

(e) be in a room with FIRE-RESISTING construction

.6 FUEL GAS CYLINDERS must bear certification markings acceptable to the Government of Samoa verifying safety and quality.

.7 Fuel storage tanks and FUEL GAS CYLINDERS must be placed so that they cannot become part of an electrical CIRCUIT, EARTHING SYSTEM or EQUIPOTENTIAL BONDING system in a BUILDING or FACILITY.

ACCEPTABLE SOLUTIONS

AGA American Gas Association International Fuel Gas Code 2012

AS/NZS 5601.1: 2013 General Gas Installations
AS/NZS 5601.2: 2013 Gas Installations

BOC Guidelines for Gas Cylinder Safety-AU435_82369

Contamination Control Guidelines of the Government of Samoa, published by PUMA, a division of MNRE

NFPA 54, ANSI Z223.1: 2015 provides minimum safety requirements for the design and installation of fuel gas piping systems in homes and other buildings

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS
- Construction drawings, specifications and/or product sheets for all fuel burning and storage elements including safety features

G6 Non-Domestic Liquid and Solid Waste

REQUIRED PERFORMANCE

THIS SECTION MUST BE READ ALONG WITH SECTION E2 HAZARDOUS PROCESSES, AND SECTION E3 EMERGENCY PLANNING AND WARNING SIGNS. PROVISIONS IN THE CONTAMINATION CONTROL GUIDELINES PUBLISHED BY PUMA MUST BE INCORPORATED INTO BUILDING PERMIT APPLICATIONS

.1 BUILDINGS, FACILITIES, SITES and SITE SERVICING must be designed and constructed so that storage, use, collection, handling and disposal of solid and liquid non-domestic waste safeguards people from injury caused by infection or contamination.

.2 BUILDINGS, FACILITIES and SITES in which non-domestic liquid waste is generated must be provided with adequate spaces and facilities for the safe and hygienic collection, holding, treatment and disposal of the waste.

.3 Litter created as a result of the use of a BUILDING, FACILITY or SITE must be prevented from spreading across a SITE and fouling roads, public land and adjacent property.

.4 Where offensive TRADE WASTE is to be stored, a separate area or room must be provided for storage which:

(a) is paved and easily cleaned

(b) is graded to drain to a suitable WASTEWATER system that will not cause harm to people, the SITE or adjacent property

(c) is WEATHERTIGHT and leak proof

(d) has a nearby, available supply of pressurised water for cleaning and emergencies

DEEMED-TO-SATISFY PROVISIONS

G6.A Solid Waste Storage and Disposal

.1 On-site solid waste (plastic containers, plastic and paper wrappings, or any waste that can be carried by wind) must be stored in suitable size plastic or metal bins and removed from the property at regular intervals, except where accumulation of waste is a function that has been approved by the Government of Samoa.

.2 Spaces in BUILDINGS and FACILITIES for the collection and temporary holding of solid waste must:

(a) be of sufficient size for the volume of waste and frequency of disposal

(b) have reasonable access for the depositing and collection of the waste

(c) be capable of sustaining sanitary conditions regarding appropriate types of waste / storage containers

(d) be capable of maintaining the appropriate temperature for the type of waste stored

(e) be of FIRE-RESISTING construction where deemed appropriate for the type of waste to be stored

.3 Where a rubbish chute is provided, it must be located and constructed to:

(a) convey the solid waste to an appropriate storage container

(b) avoid the likelihood of blockage or leakage

(c) permit easy cleaning and maintenance

(d) avoid the likelihood of foul air or gases accumulating or entering the BUILDING

(e) avoid the likelihood of the spread of fire beyond the refuse chute

(f) have openings that allow waste to be [safely] deposited in the chute

(g) restrict access by children, animals and vermin

.4 Storage areas for non-domestic solid waste on a SITE (except BUILDING GROUP 5) must:

(a) have a suitable cover so that waste cannot be blown away by wind

(b) have weather protection

(c) have additional safety measures complying with Section E Hazardous Substances in the NBC if the waste is a HAZARDOUS SUBSTANCE

d) have backflow preventers or other measures ensuring that any spillage will not enter the RETICULATED STORMWATER MANAGEMENT SYSTEM, or POTABLE water supply

G6.B Liquid Waste Storage

.1 Any substance deemed to be a HAZARDOUS SUBSTANCE must comply with Section E Hazardous Substances of the NBC.

.2 Storage of non-domestic liquid waste in a BUILDING, FACILITY or SITE must be located and constructed to reduce impact on people, the environment, and adjacent properties.

.3 Facilities for the storage, treatment, and disposal of non-domestic liquid waste must be constructed:

(a) with adequate capacity for the volume of waste and the frequency of disposal

(b) with adequate vehicle access for collection if required

(c) to avoid the likelihood of contamination of any POTABLE water supplies, GROUNDWATER, and waterways except as permitted under other legislation and policies of the Government of Samoa

(e) from materials IMPERVIOUS both to the waste for which disposal is required, and to water

(f) to avoid the likelihood of blockage and leakage

(g) to avoid the likelihood of foul air and gases accumulating within or entering into BUILDINGS and FACILITIES

(h) to avoid the likelihood of unauthorised access by people

(i) to permit easy cleaning and maintenance

(j) to avoid the likelihood of damage from superimposed loads or normal ground movement

(k) to resist hydrostatic uplift pressures if those facilities are buried underground

.4 If a liquid or solid waste pipe passes through a separating wall, it must be adequately secured and safeguarded by:

(a) sufficient sealants to block transmission of air and airborne particles from one room to another

(b) supports on either size of the pipe that secure it in place, but allow differential movement, and movement caused by minor earthquakes and trembling

.5 Liquid waste pipes that pass through rooms used for residential, assembly, retail or commercial purposes must have INSULATION to reduce noise impact.

G6.C Maintenance Access

.1 If a liquid or solid waste pipe passes through a separating wall, maintenance access must be provided by:

(a) a door or panel providing access to the pipe must not open into any HABITABLE ROOM, other than a kitchen or other room built specifically for maintenance of the pipes

(b) an access door or panel in any other part must be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and constructed of:
- (i) wood, plasterboard or blockboard not less than 38 mm thick. or
- (ii) compressed fibre reinforced cement sheeting not less than 9 mm thick, or
- (iii) other suitable material with a mass per unit area not less than 24.4 kg

.2 Where non-residential liquid waste will release an offensive odour when the system is maintained, the equipment requiring maintenance must be located to create the least offensive impact to people on SITE and on neighbouring properties.

G6.D Trade Waste Treatment and Disposal

.1 A BUILDING PERMIT for a SITE that produces and disposes of TRADE WASTE must include the following:

(a) description of the TRADE WASTE and whether it is considered to be a HAZARDOUS SUBSTANCE subject to provisions of Section E Hazardous Substances

(b) designated peak flow rate (litres per hour)

(c) grading plan for TRADE WASTE generating floor area and storage area, and surrounding lands, illustrating the ultimate path for any spills or disposals

(d) details of diversion valves or first flush systems, pumps, piping, backflow prevention devices

(e) evidence of WEATHERTIGHT construction, or other means of preventing TRADE WASTE from becoming a HAZARD

(f) evidence that all reasonable products and activities have been undertaken to reduce volume of TRADE WASTE generated

(g) evidence that treatment and disposal is appropriate for the type of TRADE WASTE using approved standards acceptable to the Government of Samoa

.2 TRADE WASTE disposed of through a RETICULATED WASTEWATER SYSTEM must have effluent metering that complies with the WSAA Trade Waste Metering Code of Practice (WSA 15 - 2014) and to the satisfaction of the Government of Samoa.

.3 Pre-treatment of TRADE WASTE must ensure the safety, health and sustainability of the site, workers and the environment by:

(a) only using proven methods and approved equipment listed on a known list of Authorised Trade Waste Pre-Treatment Products

(b) acceptable pre-treatment capacity and hydraulic load

(c) only using non-emulsifying pumps, if oily water is part of the system

(d) sufficient backflow prevention devices

(e) use of AIRTIGHT cover/lid for pre-treament system

ACCEPTABLE SOLUTIONS

AIRAH Technical Manual DA28 Building Management and Control Systems

AS 3996: 2006 Access Covers and Grates

WSAA Trade Waste Metering Code of Practice (WSA 15 - 2014)

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS
- Construction drawings, specifications and/or product sheets for all fuel burning elements including safety features

Section H

Climate Change Adaptation

Contents

Table H1: Section H - Overview of Applicable Sections

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

Section H

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
H1 Coastal Protection																
H1.A	Siting in a Coastal Zone	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H1.B	Structural Support	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H1.C	Drainage	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H1.D	Water-Resistance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H2 Weathertight Construction																
H2.A	Weathertight Building Methods	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H2.B	Junctions, Penetrations, Flashing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H2.C	Walls and Floors	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H2.D	Roofs	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H2.E	Doors	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H3 Energy Efficiency																
H3.A	Methodology and Scope	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H3.B	Orientation, Siting and Layout	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H3.C	Heat-Reflecting Materials	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H3.D	Roof, Ceiling, Walls, Floor	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H3.E	Consumption Reduction	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H3.F	Ventilation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H3.G	Air conditioning	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H3.H	Water Heating	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H3.I	Commissioning	•	•	•			•		•	•		•	•	•		•
H4 Renewable Energy																
H4.A	Solar and Wind Power	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H4.B	Geothermal Power	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H4.C	Bio-energy	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H4.D	Water-Based Energy	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H4.E	Fuel Cells and Batteries	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H4.F	Other Renewable Sources	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H5 Glazing and Windows - Heat Reduction																
H5.A	Heat Gain Prevention	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H5.B	Weather Resilience	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H6 Greenhouse Gas Emission Reduction																
H6.A	Green Building Materials	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H6.B	Environmental Performance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H6.C	GHG Calculators	•	•	•			•		•	•		•	•	•		•
H7 Green Roofs																
H7.A	Structural Support, Components	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H7.B	Growing Substrate, Vegetation	•	•	•	•	•	•	•	•	•	•	•	•	•		•
H7.C	Site Furniture, Landscape Material	•	•	•	•	•	•	•	•	•	•	•	•	•		•

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A4 to determine appropriate Building Group

STEP 2. Use Building Function definitions on page A2 and A3 to determine appropriate Building Function

STEP 3. Refer to Chart - if there is a dot on a Building Group number and a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

Refer to each section for specific requirements

Section H OBJECTIVES

H(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, and SITES must:

(a) safeguard people, property and site amenities from harm resulting from the consequences of CLIMATE CHANGE

(b) promote conservation and efficient use of energy, water and natural features

(c) promote reduction of GREENHOUSE GAS EMISSIONS

H(ii)
BUILDINGS, FACILITIES and SITES must be designed to lessen the impacts of the following potential consequences of CLIMATE CHANGE:

(a) rising air temperatures

(b) more intense rainfall

(c) more frequent cyclones

(d) increase in hail storms

(e) sea level rise

(f) increase / decrease in humidity

(g) increase in deforestation

H1 Coastal Protection

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ IN CONJUNCTION WITH SECTION J1.3 TSUNAMI RESILIENCE

.1 BUILDINGS, FACILITIES and SITES located in a COASTAL ZONE must be sited, designed and constructed to withstand the impact of:

(a) salt spray

(b) STORM SURGE from increased volume and velocity of seawater

(c) periodic FLOODING from a combination of tropical storms (RUNOFF and overflow from higher elevations) and high WATER TABLES

(d) floating debris

(e) erosion and scour

(f) NATURAL DISASTERS (cyclones and tropical storms, tsunamis and landslips) - see Section J Natural Disaster Resilience

.2 Protection, including STORMWATER MANAGEMENT (see Section B2), for BUILDINGS, FACILITIES and SITES in COASTAL ZONES as a result of:

(a) STORM SURGE from tropical storms tsunamis and cyclones

(b) RUNOFF from upland elevations and river overflows

(c) GROUNDWATER saturation due to a rise in the WATER TABLE during storm events

must be designed to:

(d) safeguard humans and property from the predicted rise in sea level resulting from CLIMATE CHANGE

(e) avoid damage to the foundation, the utility connections, and the floatation, collapse and lateral movement of the elevated portion of the building

(f) reflect policies and plans for CLIMATE CHANGE ADAPTATION approved by the Government of Samoa

.3 Construction of a SEAWALL (separate from the BUILDING or structure) will only be considered as a viable option if natural coastal management (for example, beach nourishment, mangroves) are not appropriate, as determined by the Government of Samoa, and will be subject to Section K Accessory Structures.

.4 BUILDINGS or structures designed to act as a SEAWALL must have the structural integrity and acceptable coastal environmental impact verified by a PROFESSIONAL CONSULTANT.

.5 Any alteration to natural features such as sand dunes and mangrove stands that would result in increasing the potential for damage from FLOODING is prohibited.

DEEMED-TO-SATISFY PROVISIONS

H1.A Siting in a Coastal Zone

.1 BUILDINGS, FACILITIES, SITEWORK and SITE SERVICING for properties in a COASTAL ZONE must be suitably located to avoid potential harm or injury to people and property by having regard to:

(a) COASTAL FLOOD LEVEL - a hypothetical elevation above ground level within a COASTAL ZONE that would be inundated by FLOODING from STORM SURGE, rise in GROUNDWATER levels, and storm events (such as the 25-year, 50-year, 100-year or 500-year storm) acceptable to the Government of Samoa

(b) DESIGN FLOOD LEVEL - a hypothetical elevation above ground level (not in a COASTAL ZONE) that would be inundated by FLOODING following a storm event (such as the 25-year, 50-year, 100-year or 500-year storm) acceptable to the Government of Samoa

(c) soil structure and soil bearing capacity (see Section B2.C Groundwater and Saturated Soil)

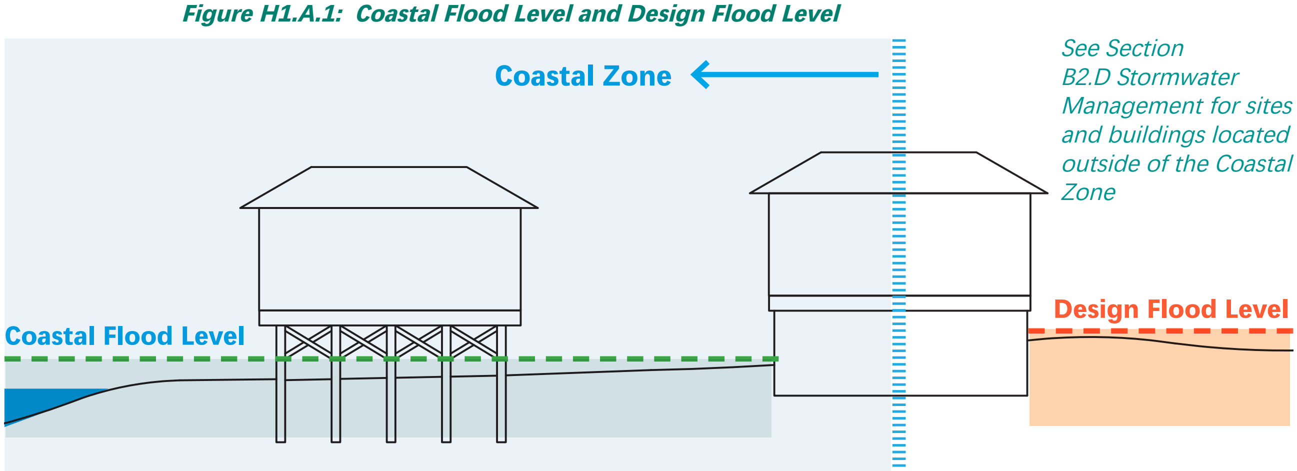
(d) shoreline composition, including natural features (beaches, rocks, mangroves) and human-induced features (jetties, SEAWALLS, rip-rap, docks, ports, and the like), and any shoreline protection areas identified by the Government of Samoa

(e) topography of the development site and surrounding lands (see Section B2.1 Construction Safety and B2.B Slope Stability)

(f) hydrology of the development site and surrounding lands, including GROUNDWATER (see Section B2.C Groundwater and Saturated Soil, and Section B2.D Stormwater Management)

(g) vegetation (see Section B2.A Construction Safety and Section B2.B Slope Stability)

Figure H1.A.1: Coastal Flood Level and Design Flood Level



.2 Where possible, BUILDINGS, FACILITIES, and SITE SERVICING should be located on the highest elevation on the property, and preferably above the COASTAL FLOOD LEVEL.

.3 Any part of a BUILDING or FACILITY constructed below the COASTAL FLOOD LEVEL must be appropriately designed to withstand impacts from STORM SURGE and FLOODING by:

(a) appropriate foundation type, structural capacity, footing depth, embedment and support (bracing)

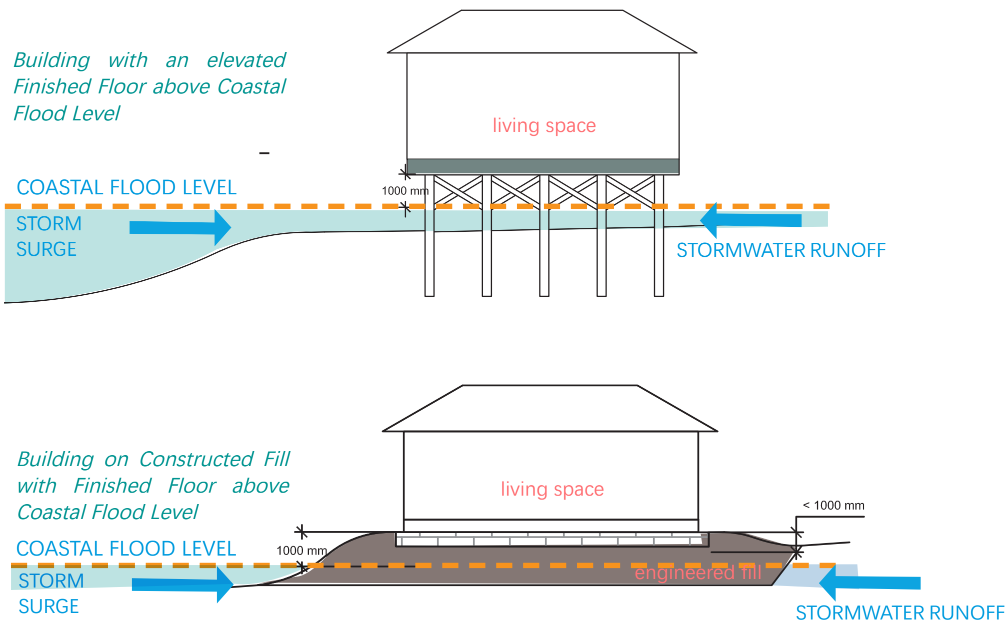
(b) appropriate WATER-RESISTANT BUILDING MATERIALS (see Section H1.D) and WEATHERTIGHT CONSTRUCTION (see Section H2)

(c) appropriate connections from footing to roof to distribute loads evenly throughout the structure

H1.B Structural Support in Coastal Zones

.1 FINISHED FLOOR for BUILDINGS and FACILITIES entirely within a COASTAL ZONE must be elevated so as not to obstruct the passage of FLOOD waters, unless it is constructed on compacted fill that raises FFL (FINISHED FLOOR) above the COASTAL FLOOD LEVEL, see examples in Figure H1.B. BUILDING GROUP 1 and TALL BUILDINGS (4 STOREYS or greater) will be subject to a custom design solution that addresses the height and scale of the DEVELOPMENT.

Figure H1.B.1: Finished Floor Level sited above Coastal Flood Level



.2 All BUILDINGS and FACILITIES with an elevated FINISHED FLOOR must have a clearance of 1,000 mm minimum between the FINISHED FLOOR and the COASTAL FLOOD LEVEL.

.3 Foundation types permitted in COASTAL ZONES appropriate to BUILDING GROUP and size must comply with Table H1.B.3.:

Table H1.B.3: Permitted Foundation Types in Coastal Zones

Permitted Foundation Types	BUILDING GROUP					TALL BUILDINGS
	1	2	3	4	5	
Elevated FINISHED FLOOR with timber or concrete footings or piles, and diagonal bracing					•	
Elevated FINISHED FLOOR with concrete footings and permeable walls (lattice, screen, louvres)					•	
Masonry walls with vents or other openings	•	•	•	•	•	•
Slab on grade foundation on constructed fill with FINISHED FLOOR above COASTAL FLOOD LEVEL	•	•	•	•	•	•
Foundation walls engineered as a SEAWALL and subject to Section K2.C Seawalls	•	•				•

.4 Foundations, including piles, must have a sufficient depth below ground to resist the effects of scour and erosion, and be strong enough to resist wave, current, and debris forces. Where a site-specific soils investigation indicates that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions, the site will be deemed unsuitable and an alternative location must be considered.

.5 Pile foundations must have the following:

(a) minimum cross-section of 0.3 m

(b) notches for beams, where used, that do not exceed 50% of the cross-section of the pile

(c) diagonal bracing where the depth between the lowest structural beam and the ground level exceeds 1.8 m.

(d) sufficient soil penetration to resist combined wave and wind loads as per AS/NZS 1170

(e) depth appropriate to soil characteristics, GROUNDWATER, depth to bedrock

(f) a load path that extends continuously and/or with adequate connections from the footing to the roof

(g) strength and reinforcement that complies with Section B Stability

.6 Acceptable material for pile foundations and beams must comply with Section B Stability, and be one of the following foundation types:

(a) pressure-treated, weather-resistant, braced timber pile (foundation to roof)

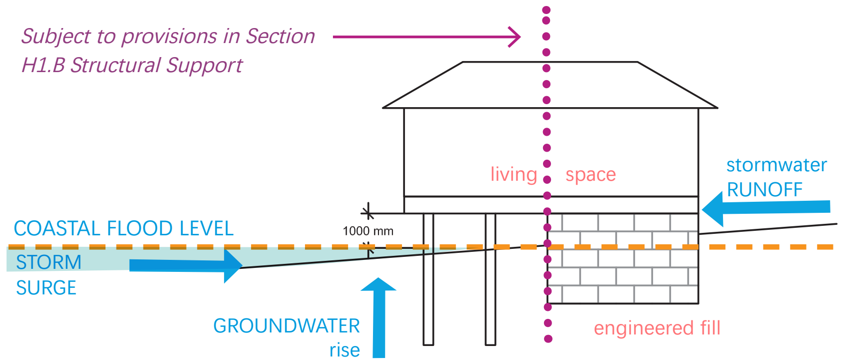
(b) pressure-treated, weather-resistant timber pile with concrete column and grade beam

(c) reinforced concrete pile and grade beam

.7 . Foundations, including piles, must have a sufficient depth below ground to resist the effects of scour and erosion, and be strong enough to resist wave, current, FLOOD and debris forces.

.8 BUILDINGS and FACILITIES constructed partially within an area subject to coastal FLOODING must have that portion within the COASTAL ZONE be constructed according to the above provisions, as illustrated in the example shown in Figure H1.B.8.

Figure H1.B.8: Properties on Edge of Coastal Zone



.9 Any property within 10.0 m of the COASTAL ZONE must have the foundation for a BUILDING or FACILITY be constructed on compacted, engineered fill.

H1.C Drainage in Coastal Zones

.1 Earthwork must be constructed to allow FLOOD waters to be diverted around the BUILDING or FACILITY to an acceptable temporary storage location such as a STORMWATER MANAGEMENT pond, and comply with Section B2 Siteworks.

.2 SITE SERVICING, including utility boxes, equipment, CABLES, etc., must be located on the elevated lowest structural beam level (minimum of 1,000 mm above the COASTAL FLOOD LEVEL) to prevent damage and service interruption during storm events.

.3 Any floors and walls located in a COASTAL ZONE must be constructed so that water can quickly drain away and not accumulate in a manner that will cause harm to the BUILDING or FACILITY.

H1.D Water-Resistance in Coastal Zones

.1 All BUILDING MATERIAL located within a COASTAL ZONE must be WATER RESISTANT such that it will not degrade upon being subjected to periodic FLOODING and STORM SURGE. Acceptable materials for floors and wall are identified in Table H1.D.1 Any materials not in the table will be considered if determined to be an acceptable ALTERNATIVE SOLUTION in accordance with the procedures in the NBC.

.2 WATERPROOF membranes for foundations, floors, and INTERIOR WALLS, and permanent partitions in the COASTAL FLOOD LEVEL must be appropriately installed.

.3 Any metal connections in the COASTAL ZONE must be heavy-duty galvanized and/or marine-grade quality to resist corrosion.

Figure H1.D.1: Water-Resistant Floor and Wall Materials in the Flood Risk Zone

Water-Resistant Building Materials (for portions of structure within the COASTAL ZONE)	Floors	Walls/Ceilings
Structural Materials (floor slabs, beams, subfloors, FRAMING and interior/exterior sheathing)		
Brick - face or glazed		•
Cast stone (in WATERPROOF mortar)		•
Cement board / fiber-cement board		•
Clay tile, structural glazed		•
Concrete - precast or in situ	•	•
Concrete Block		•
Gypsum - water-resistant, fibre-reinforced exterior sheathing		•
Plywood - marine grade	•	•
Plywood - preservative-treated, Borate	•	•
Recycled plastic lumber (RPL)		
Commingled, with 80-90% polyethylene (PE)	•	
Fibre-reinforced, with glass fibre strands	•	
High-density polyethylene (HDPE), up to 95%	•	
Stone - natural or artificial non-absorbent solid or veneer with WATERPROOF grout	•	•
Structural Building Components		
Floor trusses - steel or decay-resistant, preservative-treated solid wood	•	
Headers and Beams - steel, or decay-resistant, preservative-treated solid wood or plywood		•
Wood - solid, decay resistant, preservative-treated	•	•
Finish materials (floor coverings, wall / ceiling finishes, INSULATION, cabinets, doors, partitions, windows)		
Concrete tile with mortar set	•	
Doors - epoxy, formed-in-place		•
Glass Block		•
INSULATION - sprayed polyurethane foam (SPUF) or closed-cell plastic foams	•	•
Mastic flooring, formed-in-place	•	
Metals - ferrous		•
Paint - polyester-epoxy, oil-based, other WATERPROOF types applied to concrete walls		•
Partitions - metal. wood-frame, glass		•
Polyurethane, formed-in-place	•	
Rubber sheets or tiles with chemical-set adhesive	•	
Silicone - formed-in-place	•	
Steel panel, trim, tile with WATERPROOF adhesives		•
Stone (maximum 6% absorption rate)	•	•
Vinyl sheet (non-asbestos) with heat or solvent-welded joints applied to concrete floor or walls	•	•

ACCEPTABLE SOLUTIONS

For building materials not found below, refer to Acceptable Solutions in Section B4 Building Materials

AS 1604: 1997 Specification for Preservative Treatment Series
AS 1684.3: 2010 Residential Timber-Framed Construction – Cyclonic Areas
AS 2159: 2009 Piling - Design and Installation
AS 2327.1: 2003 Composite Structures – Simply Supported Beams
AS 2870: 2011 Residential Slabs And Footings
AS 3700: 2001 Masonry Structures
AS 4055: 2006 Wind Loads for Housing
AS 4654.1: 2009 Waterproofing Membrane Systems for Exterior Use – Above Ground Level – Materials
AS 4678: 2002 Earth-Retaining Structures
AS 4997: 2005 Guidelines for the Design of Maritime Structures.
AS 5104: 2005 General Principles on the Reliability of Structures
AS 5604: 2005 Natural Durability Ratings

AS/NZS 1080.1: 1997 Timbers – Methods of Test – Moisture Content
AS/NZS 1170: 2002 Structural Design
AS/NZS 2272: 2006 Plywood – Marine
AS/NZS 4063: 1992 Characterisation of Structural Timber Series

ISO 13823: 2008 General Principles on the Design of Structures for Durability
ISO 15928-1: 2003 Houses – Description of Performance – Part 1: Structural Safety
ISO 15928-2: 2005 Houses – Description of Performance – Part 2: Structural Serviceability
ISO 15928-3: 2009 Houses – Description of Performance – Part 3: Structural Suitability

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS
- Construction drawings, specifications and/or product sheets for all WATERPROOF membranes, sealants and the like, listing manufacturer and specifications
- Sectional drawing showing the location of existing and proposed BUILDINGS, FACILITIES, SITEWORKS and SITE SERVICING with regard to existing and proposed ocean high water lines, COASTAL FLOOD LEVEL, and site topography, hydrology and natural features

H2 Weathertight Construction

REQUIRED PERFORMANCE

.1 All BUILDINGS except **Carparks**, open-style **Stadiums**, and **Temporary Structures** (that do not have a need for weather protection) must be designed as WEATHERTIGHT to minimise the following risk factors associated with adverse effects of weather:

(a) unhealthy or dangerous conditions, or loss of amenity for occupants

(b) undue dampness or deterioration of BUILDING ELEMENTS

.2 EXTERNAL WALLS, roofs, doors, windows and other openings in WEATHERTIGHT BUILDINGS must:

(a) prevent water entry, water absorption and transmission of water

(b) prevent accumulation of water

(c) allow for dissipation of water

(d) be designed to comply with Section C Fire Protection

.3 Flashing must be installed on EXTERNAL WALLS and roofs at all openings (such as windows, doors, utility penetrations, and must be sufficiently attached so that rainwater and wind do not penetrate into the interior of the BUILDING or FACILITY.

DEEMED-TO-SATISFY PROVISIONS

H2.A Weathertight Building Methods

.1 BUILDINGS and FACILITIES less than 3 STOREYS in HEIGHT must be designed and constructed to achieve the required performance for STABILITY, safety and comfort listed in Table H2.A.1 for WEATHERTIGHT construction by any or all of the listed acceptable construction techniques in the Table or through ALTERNATIVE SOLUTIONS.

Table H2.A.1: Best Practices for Weathertight Construction for Buildings Less than 3 Storeys

Building Feature	Required Performance	Example of Acceptable Construction Techniques
Roof Wall Junction	Fully protected so that rainfall and wind cannot penetrate	• extended EAVES > 600 mm with flashing / sealant at junction • covered wrap-around porch integrated with roof • continuity of material at wall / roof junction
Building Complexity	Reduce number of occurrences where weather could penetrate by simplifying massing, roof structure	• rectangular, L, T or Y shape • reduced massing changes with limited number of angles and curves
DECKS	Sufficiently fastened to BUILDING, FACILITY or structure to prevent rain and wind from penetrating interior; structurally adequate to reduce possibility of DECK becoming air-borne during extreme weather events	• cyclone-ties and other heavy-duty fasteners at all junctions • integrated into the architecture of the structure • posts embedded into concrete footings with a 1.0 m minimum depth, or greater where soil conditions warrant it • flashing and sealants at all DECK/wall or DECK/roof junctions
CLADDING	Firmly affixed to EXTERNAL WALLS so that rainfall and wind cannot penetrate	• single CLADDING type and/or flashing / sealants at all junctions • metal corrugated sheets extending from roof to floor • cyclone grade fasteners and overlap for shingle-type CLADDING • properly sealed concrete walls, roofs
Doors, windows, vents	Fully protected so that rainfall and wind cannot penetrate	• adequately sized metal flashing surrounding all doors, windows, vents and other openings

.2 WATERPROOF membranes attached to all roofs, EXTERNAL WALLS, doors, windows and vents must be installed according to manufacturer's specifications and minimise the potential for weather penetration by having the following minimum overlaps on top of the layer below:

(a) 50 mm horizontal overlap

(b) 150 mm vertical overlap

.3 A concrete block wall must be sealed by either:

(a) thinset mortar attached to exterior of concrete block wall and sealed on all sides with appropriate flashing or sealant, or

(b) an approved concrete sealer sprayed or painted onto the exterior of the concrete block wall, and with appropriate flashing on all edges, intersections and openings

H2.B Junctions, Penetrations and Flashing

.1 To prevent water and wind from penetrating a BUILDING exterior, flashings are required to shed or divert water and/or prevent passage of air at the following locations:

(a) exterior roof/wall junctions except where fully protected by EAVES

(b) changes in CLADDING type, roofing materials, or change of direction in CLADDING or roofing materials

(c) intersections between CLADDING or roofing materials with other UNITS or BUILDINGS

(d) roof or wall penetrations, including windows, doors, vents

(e) where rainwater is discharged from a GUTTER, valley or downpipe onto a tiled roof, protection must be provided by:
- (i) a spreader pipe, or
- (ii) flashing, or
- (iii) SARKING-TYPE MATERIAL installed with a minimum width of 1800 mm either side from the point of discharge and extended down to the EAVES GUTTER

.2 Flashing material, type, size, thickness and method of application must be appropriate to the BUILDING MATERIAL it is protecting, and must consist of weather-protective material as well as sealants and/or caulking.

.3 Metal flashing or bituminous flashing tape must last the lifetime of the BUILDING, door, window or opening, or 15 years if they are ACCESSIBLE and can be easily replaced.

.4 Flexible flashing tape must:

(a) comply with Parts 3.2 and 4 of ICBO Acceptance Criteria AC148

(b) be compatible with adjacent building wall underlay or roof underlay

(c) be used only in fully concealed applications

.5 The finished height of a WATERPROOF membrane, metal flashing, or bituminous flashing tape above the finished surface level must be sufficient to prevent water, including wind-driven water, flowing over the top of the membrane.

.6 Preparation of material receiving the WATERPROOF membrane and/or flashing must be clean and dry, and primed if it is OSB (Oriented Strand Board), particle board, concrete, gypsum sheathing or other material identified in need of priming by manufacturer's specifications.

H2.C Walls and Floors

.1 EXTERNAL WALLS and the underside of a ground floor must be protected from water penetration and damage by installing a suitable water-proofing membrane (damp-proof course) according to AS 4654: 2012, Part 1 and 2. and if it is residential, it must comply with AS 2870.

,2 Where a damp-proof course is provided, it must consist of a material that complies with AS/NZS 2904.

.3 The floor at the base of a stair, lift or similar SHAFT that is adequately drained by gravitation or mechanical means need not have a damp-proof course unless site conditions or other factors determine otherwise.

.4 The sub-floor space between a suspended floor of a BUILDING and the ground must be constructed:

(a) to be clear of all building debris and vegetation

(b) to be cross-ventilated by means of evenly spaced ventilation openings allowing unobstructed air flow

(c) to contain no dead AIR SPACES

(d) to prevent SURFACE WATER from ponding under the structure

.5 INTERIOR WALLS constructed beneath the lowest FINISHED FLOOR must be provided with openings:

(a) having an unobstructed area equivalent to that required for the adjacent external openings

(b) that are evenly distributed throughout such INTERIOR WALLS

(c) with a clearance between the ground surface and the underside of the floor for air circulation

(d) that provide sufficient ventilation if obstructed by patios

H2.D Roofs

.1 To prevent water penetration, a roof must be covered with any, some, or all of the following:

(a) cellulose cement corrugated sheeting complying with AS/NZS 2908.1 and installed in accordance with AS/NZS 1562.2, or

(b) metal sheet roofing complying with AS 1562.1, or

(c) sheet roofing designed and installed in accordance with AS/NZS 4256 Parts 1, 2, 3 and 5 and AS/NZS 1562.3, or

(d) asphalt shingles complying with ASTM D3018-90, Class A, or

(e) other equivalent WEATHERTIGHT material with the same performance as the above

.2 All BUILDINGS must have a WATERPROOF membrane installed under the roof CLADDING material to prevent water penetration, and the membrane must extend and overlap onto the EXTERIOR WALLS.

.3 All roof openings must be protected according to Section H 25.B Junctions, Penetrations and Flashing.

H2.E Doors

.1 A continuous barrier to water must be installed around doors.

.2 Doors must be elevated 100-150 mm above the entry to prevent water from entering the BUILDING.

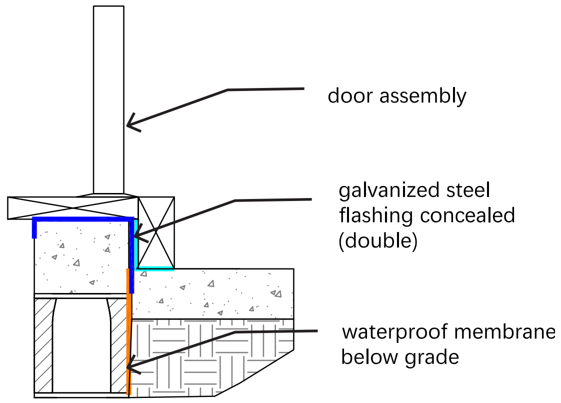
.3 Where the door is level with the entry such as on a DECK, the following must be done to prevent water accumulation at the door stoop:

(a) provide 25 mm-75 mm gap between door frame and entry where the ground is at least 150 mm below the entry level and is graded to direct water away from the BUILDING

(b) install a FRENCH DRAIN adequately sized for expected storm levels

.4 Doors raised above the entry must be protected with a WATERPROOF membrane and flashing that overlap so that water cannot penetrate, as illustrated in Figure H2.E.4:

Figure H2.E.4: Example of waterproof membrane and flashing for door stoop



ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings - Selection and Installation
AS 2870: 2011 Residential Slabs and Footings
AS 4654: 2012 Waterproofing Membranes for External Above-Ground Use - Design and Installation

AS/NZS 1562.2 1999 Design and Installation of Sheet Roof and Wall Cladding: Corrugated Fibre-Reinforced Cement
AS/NZS 1562.3: 2006 Design and Installation of Sheet Roof and Wall Cladding – Plastic
AS/NZS 1646: 2007 Elastomeric Seals for Waterworks Purposes
AS/NZS 2032: 2006 Installation of PVC Pipe Systems
AS/NZS 2033: 2008 Installation of Polyethylene Pipe Systems
AS/NZS 2280: 2012 Ductile Iron Pipes and Fittings
AS/NZS 2904: 1995 Damp-Proof Courses and Flashings
AS/NZS 2908.1: 2000 Cellulose Cement Products
AS/NZS 4200: 1994 Pliable Building Membranes and Underlays, Part 1: 1994 Materials
AS/NZS 4256: 1994 Plastic Roof and Wall Cladding Materials
AS/NZS 4347: 1995 Damp-Proof Courses and Flashings - Method of Test Series

ASTM D3018-90 Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules

NZS 4211: 1985 and 2008 Specification For Performance Of Windows

NZ Acceptable Solution E2/AS1 Amendment 6 or later - Weathertightness of the Building Envelope

New Zealand Metal Roof and Wall Cladding Code of Practice - Guidance on Flashing Materials

ISO 11600: 2002 Building Construction - Jointing Products Classification and Requirements for Sealants

Verification Method E2/VM1 Cladding Systems of Buildings Including Junctions with Windows, Doors and Other Penetrations - applicable to timber frame construction up to 3 STOREYS in height for only the following:

a) masonry veneer, paragraph 9.2
b) STUCCO, paragraph 9.3
c) timber weatherboards, paragraph 9.4
d) fibre cement weatherboards, paragraph 9.5
e) profiled metal wall claddings, paragraph 9.6
f) fibre cement sheet, paragraph 9.7
g) plywood sheet, paragraph 9.8
h) EIFS, paragraph 9.9

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS
- Construction drawings, specifications and/or product sheets for all WATERPROOF membranes, sealants and the like, listing manufacturer and specifications

H3 Energy Efficiency

REQUIRED PERFORMANCE

.1 BUILDINGS and FACILITIES, through the operation and use of fixed appliances and building services (lighting, heating, domestic hot water, ventilation and air conditioning systems) must be designed and constructed to provide opportunities to reduce solar heat gain and promote cooling of the interior appropriate to:

(a) function and use of BUILDING, FACILITY and/or SITE

(b) human comfort, health and safety in the interior environment

(c) safe operation of storage, handling and fabrication of products and/or HAZARDOUS SUBSTANCES

(d) geographic location, topography, hydrology and natural features

(e) BUILDINGS, FACILITIES, SITE WORKS and SITE SERVICING on adjacent property

(f) environmental SUSTAINABILITY

.2 Mechanical systems for cooling air temperatures (such as air conditioners and refrigeration) must only be used after a reasonable degree of the following passive solar design techniques have been incorporated into the design (appropriate to the function, use and occupancy of the BUILDING or FACILITY):

:

(a) adequate air movement through and under BUILDINGS and FACILITIES that promotes natural ventilation, regardless of whether the structure / room is air conditioned, so that it still operates during electrical or mechanical failure

(b) reduction of condensation and humidity in the interior through appropriate insulation and air movement

(c) shading of windows, roofs, doors, EXTERNAL WALLS and other parts of BUILDING or FACILITY subject to intense solar gain

(d) reflection of solar radiation

(a) orientation and siting of the BUILDING or FACILITY to maximise cooling and air flow

(f) efficient use, storage and distribution of hot water and other heating processes

.3 In addition to Section H3.2 above, all BUILDINGS and FACILITIES must incorporate the following passive solar design techniques (as illustrated in the example shown in Figure H3.3 below) to minimise unwanted heat gain in the interior by:

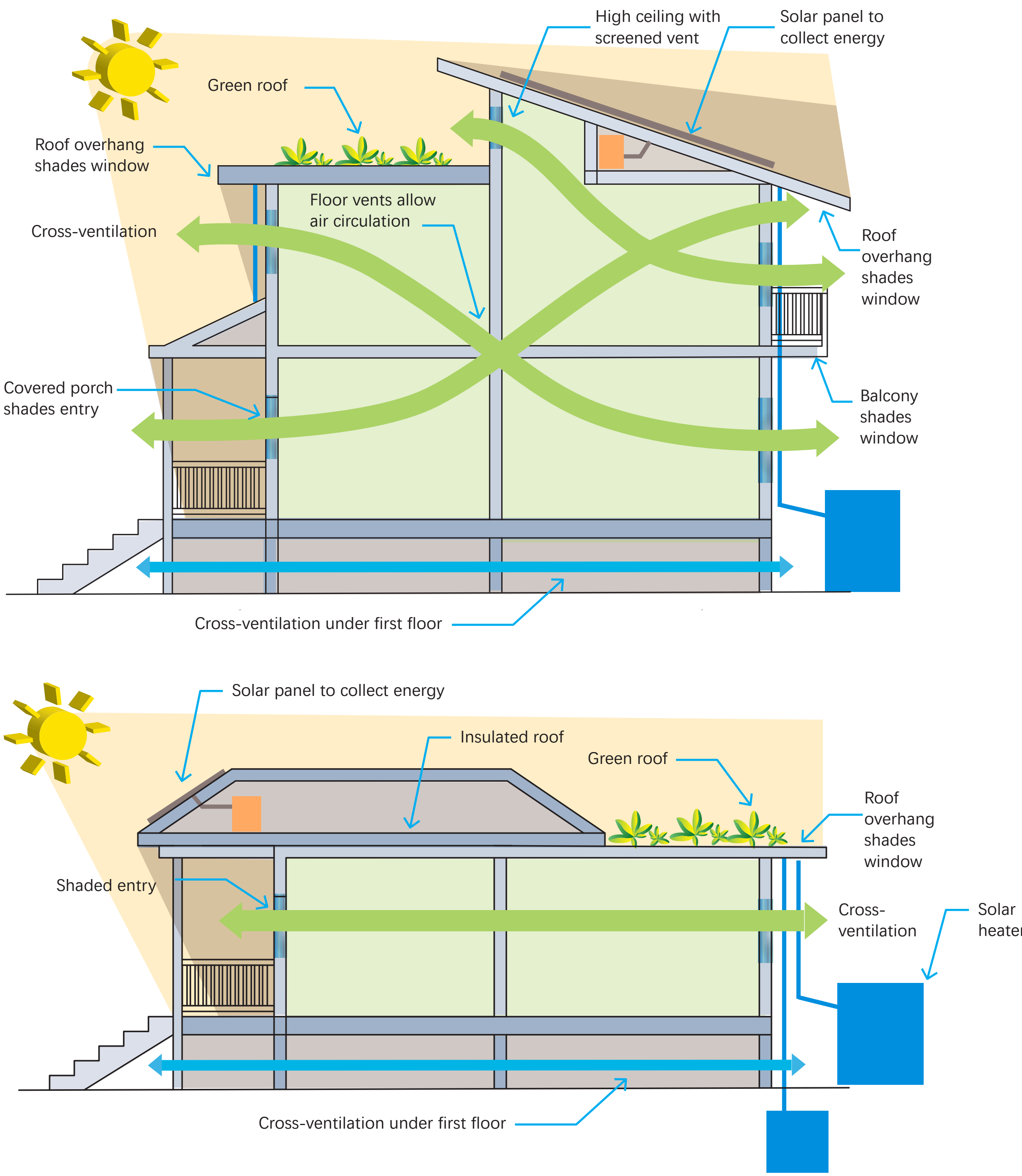
(a) use of ENERGY EFFICIENT BUILDING MATERIALS, BUILDING ELEMENTS, ASSEMBLIES and products

(b) WEATHERTIGHT construction (see Section H2)

(c) use of ENERGY EFFICIENT appliances and systems for heating and cooling

(d) use of adequate INSULATION for EXTERNAL WALLS, roofs, ceilings, windows, doors, piping, ducts, and other openings, appropriate to the BUILDING function and occupancy

Figure H3.3: Example of energy efficient design techniques



.4 A space providing mechanical ventilation and/or air conditioning within a BUILDING or FACILITY must be designed, installed and operated in an ENERGY EFFICIENT manner consistent with its function or use.

.5 For BUILDING GROUP 1-3, a COMMISSIONING plan must be submitted and approved prior to occupancy. All DEVELOPMENTS not required to have a COMMISSIONING plan must have AUTOMATED, mechanical, electrical, and PLUMBING systems tested and verified prior to issuance of an OCCUPANCY PERMIT.

DEEMED-TO-SATISFY PROVISIONS

H3.A Methodology and Scope

.1 All BUILDINGS and FACILITIES must demonstrate an ENERGY EFFICIENCY design acceptable to the Government of Samoa according to function, use and occupancy, as indicated in Table H3.A.1:

Table H3.A.1 Required Evidence for Thermal Performance per Building Group

	Appliances	Plumbing	Heating / Cooling	Windows	Roof	Ceiling / Floor / Walls	Site / Landscape	Lighting	Required Evidence
Building Group 1, 2, 3 (NZS 4243.1 and .2 Energy Efficiency in Large Buildings applies)	•	•	•	•	•	•	•	•	> Description of energy efficient design features > THERMAL PERFORMANCE Modelling
Building Group 4 and 5 (NZS 4218 Energy Efficiency for Small Building Envelope applies)	•			•	•		•	•	> Description of energy efficient design features

Submission requirements are outlined in Appendix D of the NBC, and in other policies of the Government of Samoa

.2 **Tourist Accommodation** is in BUILDING GROUP 1 - 3 is exempt from the requirement to undergo Thermal Performance Modelling as indicated in Table H3.A.1 above, if the number of occupancy UNITS in a BUILDING is 10 or less.

.3 THERMAL PERFORMANCE modelling, where required, must evaluate the ENERGY EFFICIENCY of BUILDING MATERIALS and BUILDING ELEMENTS, heating and cooling systems, as well as the structure as a whole, using any of the following methods:

.

(a) approved Thermal Performance Modelling software that complies with the ABCB Protocol for Building Energy Analysis Software, or AS/NZS 3598: 2000 Energy Audits, or approved equivalent

(b) Thermal Performance Calculators listed on the BRANZ website

(c) methods listed in ANSI/ASHRAE Standard 140-2004 (Building Thermal Envelope and Fabric Test Loads)

(d) Specification JV Annual Energy Consumption in the Building Code of Australia, Volume 1, or approved equivalent, and must include the ability to achieve all criteria listed in the annual energy consumption calculator

(e) manual calculation method (as indicated in Appendix D of the NBC)

.4 To evaluate THERMAL PERFORMANCE, the annual energy consumption of a reference BUILDING approved by the Government of Samoa may be used as the benchmark for assessment and to evaluate appropriateness of the proposed DEVELOPMENT, at the discretion of the Government of Samoa.

H3.B Orientation, Siting and Layout

.1 BUILDINGS and FACILITIES must be sited on a property with regard to:

(a) wind patterns that promote air circulation within the BUILDING or FACILITY

(b) terrain that protects the BUILDING from solar gain

(c) vegetation that provides shading of HABITABLE ROOMS

(d) applicable MNRE legislation and policies

.2 Design of BUILDINGS and FACILITIES must have the following energy-saving orientation, siting and layout, where possible and where appropriate for the use:

(a) be sited on a north facing slope, where possible, and have fewer windows on the northern facade to reduce solar heat gain inside the structure, unless properly shaded

(b) have bedrooms in a **Residential** BUILDING located on the east side with good cross-ventilation between openings in EXTERNAL and INTERNAL WALLS to promote comfortable night temperatures

(c) main rooms or other rooms in use for most of the day must be located in the interior of the structure to reduce potential for solar gain

(d) have open floor plans that promote air circulation and minimise the number of hallways

(e) in **Multiple Unit Buildings**, locate retail, industrial and other uses on the west side of the structure to the degree possible, if they are not anticipated to be used at night-time

.3 Multiple BUILDINGS on a site should have an open siting pattern between structures, to the degree possible, and/or a pattern that promotes air circulation without the creation of wind tunnels.

H3.C Heat-Reflecting Materials

.1 Materials for roofing and exterior CLADDING must be light-coloured and be rated to last the life expectancy of the BUILDING or FACILITY.

.2 Acceptable R-VALUES (rating for the resistance to the flow of heat) for BUILDING MATERIALS must comply with the following appropriate standards: .

(a) R-VALUES for ceilings, AIR SPACES, attic spaces and roof CLADDING (metal, tiles, shingles) must comply with Specification J1.3 Roof and Ceiling Construction of the Building Code of Australia, Volume 1, or an equivalent standard acceptable to the Government of Samoa

(b) R-VALUES for EXTERNAL WALL CLADDING, INTERIOR WALLS and AIR SPACES for concrete block and solid concrete walls, brick, timber, metal, and CURTAIN WALLS (metal FRAMING with GLAZING) must comply with Specification J1.5 Wall Construction of the Building Code of Australia, Volume 1

(c) R-VALUES for flooring types - internal, timber, suspended concrete slabs, concrete slab on grade, and hollow-core concrete slabs must comply with Specification J1.6 Floor Construction of the Building Code of Australia, Volume 1

H3.D Energy Efficient Roofing, Ceilings, Walls and Floors

.1 Roofs for all BUILDINGS and FACILITIES must consist of material with an acceptable R-VALUE, and at least one of the following passive solar design mechanisms:

(a) solar panels in accordance with Section J1 Renewable Energy to collect heat and use it to power appliances, mechanical systems, and the like

(b) GREEN ROOF (see Section H7 Green Roofs)

(c) INSULATION in an attic space or within a roof panel to protect interior rooms

(d) air vents in open or attic roof spaces to release heated air to the atmosphere

.2 Large-scale BUILDINGS with a GROSS FLOOR AREA greater than 500 m^2 in BUILDING GROUP 1-3 (other than a FALE) must have a portion of the roof that:

(a) contains solar panels in accordance with Section J1 Renewable Energy or

(b) contains a GREEN ROOF in accordance with Section J2 Green Roofs, or

(c) has an alternative solar reflection technique (other than reflective roofing material), or

(d) a combination of the above, or

(e) an acceptable ALTERNATIVE SOLUTION to reduce energy transfer into the structure

H3.E Energy Consumption Reduction Techniques

.1 Non-residential BUILDINGS and FACILITIES in BUILDING GROUPS 1-3 with mechanical cooling / air conditioning must be fitted with timer controls to increase/decrease energy consumption based on occupancy and hourly usage for each UNIT in the BUILDING.

.2 Non-residential BUILDINGS and FACILITIES in BUILDING GROUPS 1-3 with mechanical cooling / air conditioning (excluding **Fale Tourist Accommodation**), must be fitted with the following energy saving components:

(a) window shading, where needed, consisting of one or more of the following:
- (i) AUTOMATED blinds to shade façades in peak solar heat times of the day and year where passive solar techniques listed in Section H2 Passive Solar Design Techniques are not sufficient to reduce solar heat gain
- (ii) tinted windows to reflect solar heat
- (iii) permanently affixed interior window coverings

(b) infiltration rate of 0.25 air changes / hour when an HVAC SYSTEM is operating, and. infiltration rate of 0.5 air changes / hours when HVAC SYSTEM is not operating

(c) carbon dioxide monitoring systems

(d) electrical submetering to monitor energy use and allow adjustments based on use

.3 All BUILDINGS with air conditioning must be fitted with closable vents so that cool air supply can be restricted when conditioned rooms are not in use.

.4 Domestic and commercial/industrial fixed appliances (fridges, freezers, clothes washers, dryers, dishwashers, permanent home theatre systems, computers, imaging equipment, and heat pumps/solar water heaters/air conditioning units) must:

(a) be sized appropriate to the use, function and occupancy

(b) be located to minimise energy consumption or solar heat gain

(c) have operational controls that promote energy saving potential such as timers, on/off switches

(d) be easy to maintain

.5 Appliances listed in H4.A.1 above must have an acceptable energy use performance as indicated by any of the following ENERGY EFFICIENCY labels acceptable to the Government of Samoa:

(a) Energy Rating Labels (www.energyrating.gov.au) measuring the annual energy consumption, and/or

(b) MEPS Minimum Energy Performance Standards, and/or

(c) Energy Star. and/or

(d) other recognized energy rating system acceptable to the Government of Samoa

H3.F Ventilation

.1 Comfortable indoor temperature must be achieved through any, some, or all of the following:

(a) INSULATION in walls, ceilings, floors, attic spaces

(b) high performance window GLAZING

(c) natural ventilation

(d) external shading of windows and proper window coverings

(e) high-efficiency fans in living and attic spaces

(f) ENERGY-EFFICIENT mechanical air conditioning system (see Section H4)

.2 Ventilation systems in non-residential BUILDINGS must be sized and configured to accommodate future expansion of the BUILDING or FACILITY, and be equipped with:

(a) exhaust outlets and PLUMBING vents a minimum of 6.0 m away from outdoor air intakes

(b) outdoor air intakes located at least 9.0 m away from sources of pollution including dumpsters, parking areas, driveways, loading docks, natural gas lines, wet cooling towers and garage doors / exhaust outlets

(c) outdoor air intakes protected with 6.4 mm or smaller mesh screens and filters

(d) roof drainage that slopes away from outdoor air intakes

(e) account for the demands of any fixed combustion appliances

.3 Natural ventilation must consist of any, some, or all of the following, appropriate to the size and use of the BUILDING or FACILITY:

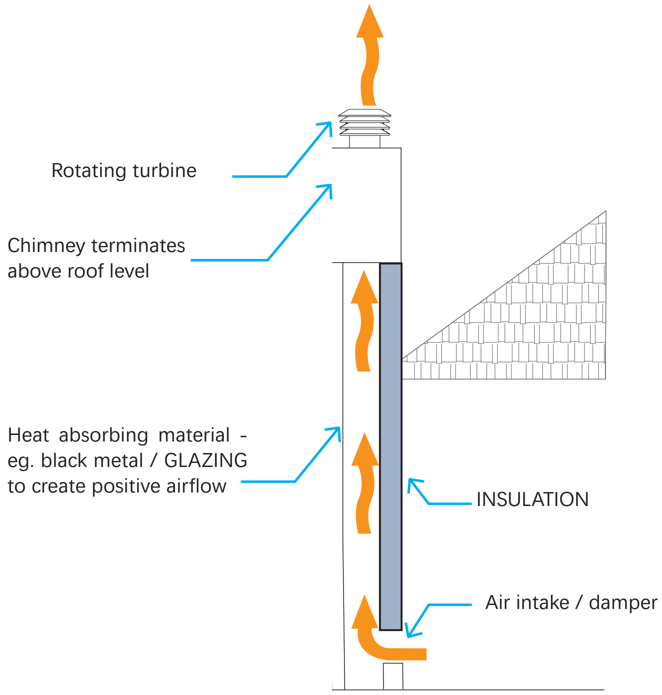
(a) windows, doors or other devices which can be opened or have louvres, and are of sufficient size and appropriately placed (larger openings on the downwind, or leeward, facade, and smaller openings on the breeze, or windward side)

(b) high ceilings (greater than 2.2 m) to promote heated air to rise above living spaces

(c) vents located within 250 mm of the ceiling to release heated air to the outside

(d) thermal chimneys in EXTERNAL WALLS that are designed to draw in and expel heated air to the exterior, as illustrated in Figure H3.C.3

Figure H3.C.3: Thermal Chimney in Exterior Wall



.4 Openings must be must be screened to prevent entry of birds, rodents, leaves, and other similar objects, and must release heated air to:.

(a) outside the BUILDING or FACILITY that is open to the sky, or

(b) an open veranda, carport, or

(c) a **Carpark**

.5 Enclosed attic spaces and cathedral ceilings must have adequate ventilation that provides:

(a) cross-ventilation through louvred windows and/or vents

(b) exhaust fans: where needed to expel heated air

H3.G Air Conditioning and Mechanical Ventilation

.1 An air conditioning system (except for an air conditioning unit in a single room less than 20 m^2 in area) must have the following ENERGY EFFICIENCY features:

(a) be capable of being deactivated when the BUILDING, FACILITY or room is not occupied

(b) be capable of stopping the flow of water to non-operating heaters, chillers and/or coils

(c) have a variable speed fan and be capable of providing variable cooling temperatures

throughout the day and night where appropriate to the function and use of the BUILDING, FACILITY or room

(d) include a dehumidification system

.2 When serving more than one air conditioning zone in a BUILDING or FACILITY, or areas with different cooling needs, the air conditioning system must:

(a) thermostatically control the temperature of each zone or area

(b) not control the temperature by mixing actively heated air and actively cooled air

(c) provide closure of outside air and return dampers when air conditioning system is deactivated

.3 Fans of an air conditioning system (except for an air conditioning unit in a single room less than 20 m^2 in area) must comply with Specification J5.2a Fans in the Building Code of Australia, Volume 1.

.4 Pumps must be ENERGY EFFICIENT and rated according to:

(a) MEPS Minimum Energy Performance Standard in AS/NZS 3823.2: 2013 Performance of electrical appliances – air conditioners and heat pumps – Part 2: Energy labelling and minimum energy performance standards (MEPS) requirements, or

(b) an energy rating system acceptable to the Government of Samoa

.5 Components in an air conditioning and/or mechanical ventilation system must comply with the following sections in the Building Code of Australia, Volume 1:

(a) ductwork INSULATION and sealing - Specification J5.2b

(b) INSULATION for piping, vessels, heat exchangers and tanks containing heating or cooling fluid other than those with INSULATION levels covered by MEPS - Specification J5.2c

(c) heater - Specification J5.2d

(d) refrigerant chillers - Specification J5.2e

.6 A mechanical air-handling system installed in a BUILDING or FACILITY must:

(a) control the circulation of objectionable odours

(b) control the accumulation of harmful contamination by micro-organisms, pathogens

(c) be in accordance with AS 1668.2 and AS/NZS 3666.1

.7 Water systems permanently attached to cooling towers must have:

(a) backflow prevention to protect any POTABLE water supply that could be impacted

(b) a cooling tower ventilated air gap measured from the rim of the cooling tower basin sufficient to keep heat and humidity at acceptable, safe levels

(c) pipes that discharge to an ON-SITE WASTEWATER MANAGEMENT system or a piped disposal system connecting to a RETICULATED WASTEWATER SYSTEM

.8 Condensate pipes and bleed down pipes installed in air conditioning equipment (including evaporative coolers) other than cooling towers must discharge to any of the following:

(a) an evaporative tray if specified by the manufacturer, or

(b) a sanitary drainage system by way of a tundish or self-sealing device, which complies with either clause 4.6.7.8 or clause 11.21 of AS/NZS 3500.2, or

(c) a STORMWATER MANAGEMENT SYSTEM, or

(d) a SOAKPIT, but only if a WASTEWATER or STORMWATER MANAGEMENT SYSTEM is not available and the discharged water will not cause damage to BUILDINGS and/or FACILITIES by changing soil moisture conditions, or

(e) a stormwater downpipe directly over the connection to the roof GUTTER, or

(f) directly to the stormwater downpipe below the connection to the roof GUTTER provided a means of ,overflow or reverse flow protection is incorporated

.9 Ceiling fans used as part of a cooling system must:

(a) be permanently installed

(b) have a speed controller

(c) be sufficient in size to serve the whole room according to Table H4.B.9 below, or have additional fans installed so that the entire room is served

Table H4.B.9 Energy Star Suggested Fan Sizes per Room Size

Room Dimensions (m^2)	Fan Blade Size (inches)	Fan Blade Size (cm)
Up to 7.0	29 - 36	74 - 91
7.0 to 13.5	36 - 42	91 - 107
> 13.5 to 20.9	42 to 50	107 to 127
> 20.9 to 37	50 - 54	127 to 137

H3.H Water Heating Systems

.1 The design, construction, installation, replacement, repair, alteration and maintenance of a heated water supply must be in accordance with:

(a) AS/NZS 3500, or

(b) Section 3 of AS/NZS 3500.5 for **Single Unit Residential** or FACILITY, or

(c) NZS 4305:1996 Energy Efficiency – domestic type hot water systems regarding:
- (i) maximum standing heat loss (kWh per day) for electric hot water cylinders
- (ii) maximum gas consumption rate and minimum thermal efficiency for gas hot water cylinders

.2 Heated water systems must be ENERGY EFFICIENT appropriate to:

(a) the type of heated water supply (storage, continuous flow, or a combination thereof)

(b) siting of the BUILDING or FACILITY

(c) location of the heated water supply

(d) low GREENHOUSE GAS EMISSION energy source (such as high efficiency gas, solar or electric heat pump water heaters)

(e), size, function and use of the BUILDING or FACILITY

.3 ENERGY EFFICIENT water heating systems include energy obtained from:

(a) RENEWABLE ENERGY sources such as solar, geothermal, wind, BIO-ENERGY (see Section H5)

(b) by-products from co-generation and industrial processes which could otherwise be rejected from the BUILDING and/or FACILITY

(c) a source that has a GREENHOUSE GAS EMISSIONS rate that does not exceed 100 g CO2 –e/MJ of thermal energy load

.4 A water heater in a heated water supply system must be:

(a) a solar heater complying with AS/NZS 4234, and/or

(b) an ENERGY EFFICIENT heat pump complying with AS/NZS 3823.2: 2013 Performance of Electrical Appliances – Air conditioners and Heat Pumps – Part 2: Energy Labelling and MEPS Requirements, and/or

(c) a gas water heater rated not less than 5 stars in accordance with AS 4552, and/or

(d) an electric resistance water heater, and/or

(e) a wood fired thermosiphon water heater or direct fired water heater each complying with AS/NZS 3500.4

.5 The following energy saving techniques must be used in a heated water supply system:

(a) locate heating source close to points of use, ensuring that pipe runs are as short as possible

(b) insulate hot water pipes to reduce heat loss

(c) size the system so that only as much water as needed to meet peak demand is heated and stored

(d) use low flow fixtures

.6 Hot water storage cylinders must:

(a) be large enough to meet draw-off demand and appropriate to occupant use or required use in a BUILDING

(b) have sufficient recovery capacity to be ready for the next draw-off demand

(c) include a non-return valve (unless supply is from a water tank)

(d) have temperature controlled by a thermostat (electric and gas heating) to prevent bacterial growth and scalding and/or a tempering valve

(e) be insulated using any or all of the following:
- (i) wool with cotton exterior
- (ii) wool with foil exterior
- (iii) fibreglass with foil exterior
- (iv) other insulating material acceptable to the Government of Samoa

.7 Gas storage water heaters must:

(a) have adequate ventilation of the cylinder

(b) have a flue to remove exhaust gases

(c) be serviced annually

(d) be adequately maintained by flushing out regularly to remove water sediment at the bottom of the cylinder and checked to ensure that vents are not blocked

.8 Continuous flow systems must be appropriately sized and designed to be ENERGY EFFICIENT, and used primarily to support a hot water storage system.

.9 Electric Storage Water Heaters, Gas Storage Water Heaters and Gas Instantaneous Water Heaters must meet Minimum Energy Performance (MEPS) requirements under one or all of the following:

(a) Australian standards - GEMS Greenhouse and Energy Minimum Standards (Electric Water Heaters) Determination 20121

(b) New Zealand standards - Energy Efficiency (Energy Using Products) Regulations 2002, reprinted in October, 2015

H3.I Commissioning of Large Buildings

.1 Objectives for COMMISSIONING that must be satisfied are:

(a) to test and/or validate that the use and operation of the mechanical, electrical, PLUMBING

and any other AUTOMATED systems meet performance standards in the NBC prior to issuance of an OCCUPANCY PERMIT

(b) to provide documentation acceptable to the Government of Samoa verifying the COMMISSIONING results

.2 COMMISSIONING must follow best practices acceptable to the Government of Samoa for QUALITY ASSURANCE of AUTOMATED, mechanical, electrical, and PLUMBING systems in a BUILDING, FACILITY or SITE.

.3 All COMMISSIONING plans must include the following at the different DEVELOPMENT stages:

(a) Planning Stage (submitted as part of the BUILDING PERMIT application)
- (i) identify COMMISSIONING team, roles, responsibilities
- (ii) establish budget to carry out COMMISSIONING process
- (iii) develop COMMISSIONING strategy
- (iv) prepare detailed COMMISSIONING Plan
- (v) ensure COMMISSIONING Plan details are incorporated into tender drawings and specifications

(b) Construction
- (i) undergo testing and validation of all systems subject to the COMMISSIONING plan prior to substantial completion
- (ii) address deficiencies until acceptable performance level is achieved and verified by a suitable authority acceptable to the Government of Samoa
- (iii) landowner must ensure instruction manuals and training are provided prior to occupancy
- (iv) document and submit evidence of the above as part of request to obtain an OCCUPANCY PERMIT

(d) Post-Construction Warranty Period
- (i) test and re-evaluate the performance of systems identified in the COMMISSIONING plan at intervals appropriate to the nature and function of systems
- (ii) document the above and all other findings, observations, assessments and recommendations in a final COMMISSIONING Report that must be acceptable to the Government of Samoa prior to the issuance of a Final Completion certificate

(e) BUILDING LIFESPAN
- (i) conduct periodic inspections, testing and validation every 3-5 years or a specified in the COMMISSIONING Plan
- (ii) undertake any improvements, repairs or alterations necessary to achieve the required performance
- (iii) document the above and all observations, assessments and recommendations in a COMMISSIONING Update Report acceptable to the Government of Samoa

.4 COMMISSIONING Plans must include at a minimum:

(a) objectives and purpose of each system, and methods for achieving objectives with reference to the NBC

(b) indoor / outdoor design conditions

(c) occupancy, usage, and schedule assumptions

(d) internal loads assumptions

(e) ventilation requirements

(f) equipment sizing calculations and criteria

(g) all sequences of operation

(h) ENERGY EFFICIENCY control strategies and associated design intent

(i) problem resolution process to deal effectively with:
- (i) system performance failure
- (ii) energy-efficiency improvement needs
- (iii) indoor environmental/air quality issues

(j) operation and maintenance schedule and manuals

(k) staff training procedures

(l) drawings identification location, type, model no. and installation of equipment and systems in the COMMISSIONING Plan (also known as As-Built Drawings)

ACCEPTABLE SOLUTIONS

ABCB: 2006 Protocol for Building Energy Analysis Software Version 2006.1

Acceptable Solution G12/AS1 Water Supplies

ALF 3: The 'Annual Loss Factor' Method. A Design Tool for Energy Efficient Houses, 3rd edition (April 2000)

ANSI/ASHRAE Standard 140 - 2004 Building Thermal Envelope and Fabric Test Loads

AS 1056.1-1991, Storage Water Heaters – General Requirements
AS 1366: 1992 Rigid Cellular Plastics Sheets for Thermal Insulation, Part 1 : 2010 Materials, Design, Performance
AS 1668.2: 2012 The Use of Air Conditioning and Ventilation in Buildings
AS 3999: 1992 Thermal Insulation of Dwellings - Bulk Insulation - Installation Requirements
AS 4234: 2008 Heated Water Systems - Calculation of Energy Consumption
AS 4420: 2014 Windows - Methods of Test Series
AS 4426-1997 Thermal Insulation of Pipework, Ductwork and Equipment – Selection, Installation and Finish
AS 4508-1999 Thermal Resistance of Insulation for Ductwork Used in Building Air Conditioning
AS 4552: 2005 Gas-Fired Water Heaters for Hot Water Supply and/or Central Heating
AS 4755.3.1-2008 Demand Response Capabilities and Supporting Technologies for Electrical Products – Interaction of Demand Response Enabling Devices and Electrical Products – Operational Instructions and Connections for Air conditioners
AS/NZS 4692.1:2005, Electric Water Heaters - Energy Consumption, Performance and General Requirements
AS/NZS 3500: 2013: Plumbing and Drainage
AS/NZS 3598: 2000 Energy Audits
AS/NZS 3666.1: 2011 Air-Handling and Water Systems of Buildings
AS/NZS 3823.2: 2013 Performance of Electrical Appliances – Air Conditioners and Heat Pumps
AS/NZS 4234: 2008 Heated Water Systems - Calculation of Energy Consumption
AS/NZS 4552.2:2010 Gas Fired Water Heaters for Hot Water Supply and/or Central Heating – Minimum Energy Performance Standards for Gas Water Heaters
AS/NZS 4859: 2002 Materials for the Thermal Insulation of Buildings
AS/NZS 4965.1:2008 Performance of Close Control Air Conditioners – Testing for Rating

AS/NZS ISO 14001:2004 Environmental Management Systems – Requirements with Guidance For Use
AS/NZS ISO 14031:2000 Environmental Management – Environmental Performance Evaluation – Guidelines

ASTM C 1549:2009 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

BS 7190: 1989 Method for Assessing Thermal Performance of Low Temperature Hot Water Boilers Using a Test Rig

Building Code of Australia, Volume 1
- Specification JV Annual Energy Consumption
- Specification J1.3 Roof and Ceiling Construction
- Specification J1.5 Wall Construction
- Specification J1.6 Floor Construction
- Specification J5.2a Fans
- Specification J5.2b Ductwork Insulation and Sealing
- Specification J5.2c Piping, Vessel, Heat Exchanger and Tank Insulation
- Specification J5.2d Space Heating
- Specification J5.2e Energy Efficiency Ratios

BRANZ House Insulation Guide: 1995
BRANZ Paper C1: 1978 A Construction Guide To Home Insulation (second edition)

EN 15643-1: 2010 Sustainability of Construction Works - Sustainability Assessment of Buildings - Part 1
EN 15942:2011, Sustainability of Construction Works – Environmental Product Declarations – Communication Format Business-to-Business.

Energy Efficiency (Energy Using Products) Regulations 2002, reprinted in October, 2015, Government of New Zealand
EnergyPlus Whole Building Simulation Software, US. Department of Energy, available from https://energyplus.net

EN 15900:2010, Energy Efficiency Services – Definitions and Requirements

Heat Pump Water Heater Guide For Households, Commonwealth of Australia, 2013, ISBN: 978-1-921516-88-7

HB 276:2004, A Guide to Good Practice for Energy Efficient Installation of Residential Heating, Cooling & Air Conditioning Plant & Equipment.

ISO 2129-1:2011, Sustainability in Building Construction – Sustainability Indicators – Part 1: Framework for the Development of Indicators and a Core Set of Indicators for Buildings

ISO 15392: 2008 Sustainability In Building Construction – General Principles

ISO 21931-1:2010 Sustainability in Building Construction - Framework for Methods of Assessment of the Environmental Performance of Construction Works - Part 1: Buildings

ISO/TS 21929-1: 2006 Sustainability in Building Construction - Sustainability Indicators - Part 1

ISO 50001:2011, Energy Management Systems – Requirements with Guidance for Use

National Design Handbook Prototype on Passive Solar Heating and Natural Cooling of Buildings, HS/182/89/E ISBN UN Habitat, 1990

NZS 4214: 2006 Methods Of Determining the Total Thermal Resistance of Parts of Buildings

NZS 4218: 2004 Energy Efficiency – Housing and Small Building Envelope

NZS 4243: 1996 Energy Efficiency – Large Buildings - Part 1: 2007 Building Thermal Envelope, and Part 2: 2007 Lighting

NZS 4246: 2006 Energy Efficiency – Installing Insulation in Residential Buildings

NZS 4305: 1996 Energy Efficiency – Domestic

NZS 4602: 1988 Low Pressure Copper Thermal Storage Electric Water Heaters

NZS 4603: 1985 Installation of Low Pressure Thermal Storage Electric Water Heaters with Copper Cylinders

Product Profile: Heat Pump Water Heaters - Air-Source Heat Pump Water Heaters in Australia and New Zealand

Product Profile: Solar Water Heater, Commonwealth of Australia, 2014, ISBN: 978-1-925092-39-4

PREN 15978: 2009 Sustainability of Construction Works - Assessment of Environmental Performance of Buildings

Solar and Heat Pump Hot Water Systems: Plumber Reference Guide, Department of Climate Change and Energy Efficiency, October 2010, ISBN: 978-1-921298-97-4

Solar Water Heater Guide for Households, Commonwealth of Australia, 2013, ISBN: 978-1-922106-97-1

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- PRODUCT INFORMATION SHEETS or other documentation indicating acceptable THERMAL PERFORMANCE, GREENHOUSE GAS EMISSION rates, annual energy consumption rates

- Annual Energy Consumption Calculations for selected BUILDING types

- PRODUCT INFORMATION SHEETS and other documentation listing R-values for roof materials, ceilings, walls and floors

- A COMMISSIONING Plan containing all required information for BUILDING GROUP 1-3

H4 Renewable Energy

REQUIRED PERFORMANCE

.1 All BUILDINGS and FACILITIES must use RENEWABLE ENERGY (energy generated from solar, wind, geothermal, BIO-ENERGY, hydroelectric, tides/waves, FUEL CELLS, and other sources acceptable to the Government of Samoa) as a source of power for any, some, or all of the following, where appropriate:

(a) electricity generation

(b) hot water supply

(c) heating of materials / processes

(d) appliances

(e) air conditioning

.2 Performance targets for RENEWABLE ENERGY supply are as follows:

(a) BUILDING GROUP 1-2 and **Industrial Buildings** -100% of energy supply must be RENEWABLE ENERGY

(b) all others - a reasonable proportion of energy required for the operation and use of the BUILDING, FACILITY or SITE must be provided by a RENEWABLE ENERGY source

(c) BUILDING GROUP 5 - RENEWABLE ENERGY must be used for:
(i) hot water
(ii) air conditioning
(iii) swimming pool pump, heater and exterior lighting

.3 All BUILDINGS, FACILITIES and SITES (except **Temporary Structures** and **Regulated Fales**) are required to be RENEWABLE-READY by providing:

(a) adequate STABILITY to support a future RENEWABLE ENERGY system

(b) infrastructure and openings to allow easy installation of future RENEWABLE ENERGY systems

(c) sufficient space, infrastructure and openings to support future RENEWABLE ENERGY infrastructure

.4 All BUILDINGS, FACILITIES and SITES in BUILDING GROUPS 1 and 2 must provide RENEWABLE-READY infrastructure for non fossil fuel modes of travel (electric and FUEL CELL cars, scooters, bicycles, and other modes of travel deemed acceptable by the Government of Samoa), including:

(a) sufficient and convenient storage and/or parking

(b) ability to conveniently re-charge source of energy

.5 All RENEWABLE ENERGY systems must be installed by a person qualified to carry out such work as deemed acceptable to the Government of Samoa.

.6 Design and construction of RENEWABLE ENERGY systems must achieve the following standards:

(a) use BUILDING MATERIALS that are ENERGY EFFICIENT, structurally sound, and DURABLE

(b) acceptable wind resistance according to AS/NZS 1170.2

(c) acceptable fire protection according to Section C Fire Protection

(d) be sited to avoid conflicts with stormwater, natural features (trees, water bodies, etc.) and natural DISASTERS

(e) be attached to BUILDING ELEMENTS (walls, roofs), where appropriate, that can structurally support the additional weight of the RENEWABLE ENERGY system

(f) use acceptable electrical, mechanical and PLUMBING equipment and installation (Section G)

(g) use energy storage mechanisms such as batteries, when applicable, that are sited appropriately and sized sufficiently to meet energy needs of the RENEWABLE ENERGY system

(h) use power inverters appropriate to the voltage system in Samoa and that are certified for health and safety by a recognised approval agency acceptable to the Government of Samoa

.7 All RENEWABLE ENERGY systems that connect to Samoa's power supply grid must receive approval from the relevant government agencies of Samoa (water, electricity, etc.) prior to issuance of a BUILDING PERMIT.

.8 Ground-mounted RENEWABLE ENERGY systems must be supported by the following, as appropriate, and according to AS 1170.2, as amended:

(a) rammed-posts extending sufficiently deep into an appropriate soil structure

(b) concrete foundation with reinforcement

(c) post-mounted attached to a base with sufficient STABILITY and DURABILITY

DEEMED-TO-SATISFY PROVISIONS

H4.A Solar and Wind Power

.1 BUILDINGS, FACILITIES and SITES may use any, some, or all of the following systems of solar power:

(a) roof-mounted solar panels

(b) stand-alone solar panels

(c) solar shingles

(d) thin film solar sheets direct applications

(e) solar water heating, air conditioning and fans

(f) solar appliances

(g) exterior solar lighting for illumination, signs, traffic signals

(h) solar walkways, roads and road markings

(i) solar heating for pools and spas

(j) other solar energy systems and products acceptable to the Government of Samoa

.2 Solar roof-mounted systems must:

(a) be constructed of stainless steel, galvanised steel, aluminium or other sufficient, DURABLE material providing corrosion protection

(b) preferably be sited on northern roof slopes at sufficient minimum roof angles specific to the product

(c) not protrude more than:

(i) **residential** BUILDINGS - 100 mm above the surface of the roof

(ii) all other BUILDINGS and FACILITIES:

(A) sloping roof - 200 mm above the surface of the roof where in accordance with the wind load

(B) flat roof - 1.0 m above the surface of the roof where appropriate to the wind load unless visually screened by BUILDING MATERIALS and methods acceptable to the Government of Samoa

(d) not overhang the roof edge at any point

(e) be installed a minimum of 200 mm from the edge of the plane of the roof

.3 Solar shingles or solar wall CLADDING installed instead of shingles or CLADDING must be WEATHERTIGHT.

.4 Batteries that store energy derived from solar and wind collectors must be accessible for easy maintenance but visually screened from view.

.5 The usage of solar energy systems and/or wind turbines must not conflict with the operation, safety and use of BUILDINGS, FACILITIES and SITE activities on adjacent properties, or with the comfort level of occupants on adjacent properties.

.6 Design and construction of wind turbines must incorporate the following safety measures:

(a) have a minimum separation distance of 5.0 m between the ground level and the lowest part of any wind turbine blade

(b) be located a minimum of 5.0 m from any property boundary

(c) for BUILDING GROUP 4 and 5, have a maximum swept area (height of blades times diameter of rotation) of no more than 3.8 m^2

(d) be protected from high winds and extreme weather conditions through either of the following:

(i) able to be easily demounted prior to extreme weather events, and/or

(ii) able to be restrained prior to extreme weather events

(e) use non-reflective materials on blades

(f) be constructed to withstand seismic impacts according to AS/NZS 1170.5

(g) be removed as soon as reasonably practicable when no longer used for power supply

.7 BUILDING-mounted wind turbines must:

(a) not protrude more than 3.0 m above the highest part of the roof (excluding the chimney) or exceed an overall height (including BUILDING, hub and blade) of 15 m, whichever is the lesser, for any part (including blades)

(f) be located to enhance the architectural quality of the BUILDING, FACILITY or SITE, and/or be located designed and constructed to reduce its visual impact

H4.B Geothermal Power

.1 BUILDINGS, FACILITIES, and SITES using geothermal energy as a power source require approval from appropriate ministries of the Government of Samoa prior to being considered for a BUILDING PERMIT.

.2 Construction and installation of geothermal energy infrastructure and equipment will require compliance with relevant sections of the NBC , including:

(a) Section B Stability

(b) Section C Fire Protection

(c) Section E Hazardous Substances

(e) Section G Site Servicing and Waste

.3 All BUILDINGS and FACILITIES in BUILDING GROUP 4 and 5, and in BUILDING GROUP 3 (except **Office/Commercial/Industrial** and **Mixed Use**) that use a small-scale, closed loop geothermal energy system to generate electricity for heating or cooling must:

(a) be equipped with a thermal pump and appropriate piping, heat exchanger and ductwork

(b) have a ground loop system (horizontal or vertical) filled with a water solution

(c) have appropriate connections to heating and cooling equipment and piping inside the structure

.4 Large-scale geothermal energy systems in BUILDING GROUPS 1 and 2, and **Office/Commercial/Industrial** and **Mixed Use** structures in BUILDING GROUP 3 are subject to Section H5.B.3 (above), and may be required to undergo an Environmental Impact Assessment as determined by the appropriate ministries of the Government of Samoa.

.5 Any deep geothermal energy system greater than 200 m in depth must have an Environmental Impact Assessment approved by the Government of Samoa before issuance of a BUILDING PERMIT.

H4.C Bio-energy

.1 Use of BIO-ENERGY as an energy source for the use and operation of BUILDINGS, FACILITIES and on-site equipment must not have significant adverse impacts on soils, water resources, biodiversity, ecosystem function, air quality, and health, safety and well-being of local communities.

.2 Construction and installation of BIO-ENERGY as an energy source for heating / cooling a BUILDING or FACILITY, and/or to produce electricity to be fed back to the grid, must comply with relevant sections of the NBC, including:

(a) Section B Stability - of underground, partially-submerged, or above-ground storage tanks

(b) Section C Fire Protection - for BUILDINGS, **Minor Structures**, electrical system

(c) Section E Hazardous Substances - appropriate storage of BIO-ENERGY so that it does not become volatile, and appropriate treatment of waste products from BIO-ENERGY production

(d) Section F Interior (Indoor Air Quality) for any proposed BUILDINGS, rancid odours

(e) Section G Site Servicing and Waste - sewage and water supply piping, electrical safety

(f) Section H Climate Change Adaptation - thermal performance for structures

.3 Storage areas for organic matter (prior to combustion) must:

(a) be WEATHERTIGHT but also have sufficient ventilation to prevent condensation build-up and mould

(b) provide for easy inspection of level of fuel (e.g. hatch, window, webcam)

(c) have the interior be free from electrical sockets, switches, and exposed electrical fittings

(d) be physically separated from the BIO-ENERGY generator by:
- (i) a minimum 5.0 separation distance, or
- (ii) a physical separation such as a solid wall constructed to prevent leakage from spreading between the storage area and the generator

.4 Tanks used for combustion and generation of BIO-ENERGY must be:

(a) fabricated and/or constructed of DURABLE, WEATHERTIGHT material

(b) appropriately sealed at all openings

(c) include precautionary measures to ensure gas generated from combustion does not mix with air in dangerous proportions

(d) constructed to reduce potential for negative pressure inside the tank

.5 Tanks that are positioned partially-submerged in the ground or underground must be constructed:

(a) on a portion of the SITE not impacted by a high GROUNDWATER level

(b) on a portion of the SITE not prone to FLOODING unless STORMWATER MANAGEMENT techniques can effectively manage impacts from the 500 year storm, and any openings to digester tanks are sited above the 100-year storm

(c) on a compacted subgrade

(d) with suitable drainage under the tank consisting of a layer of 25 mm dia. aggregate or the like, and a perforated PVC pipe to convey water to a suitable DISCHARGE AREA

(e) with a suitable root barrier to protect the tank from intrusion of roots from nearby vegetation

(f) with appropriate structural reinforcement to withstand vibration and movement from seismic activity

(g) with both of the following WATERPROOFING agents attached to the entirety of the tank exterior where the tank is made of concrete or other porous material:

(i) asphalt-based coating, or the like, sprayed onto tank exterior

(ii) WATERPROOF membrane - bitumen, plastic, metal, PVC or other suitable material

.6 ELECTRICAL EQUIPMENT, including connections from the BIO-ENERGY generating system to the RETICULATED electrical supply must comply with all aspects of Section G4 Electrical Safety.

.7 Waste from the BIO-ENERGY generation process must be treated in an appropriate storage area so that it achieves the proper nutrient balance and chemical composition prior to being applied as fertiliser, transported, or for any other approved use.

.8 Reducing the potential for offensive odour emanating from any part of the BIO-ENERGY generation system must be incorporated into the design of BUILDINGS, FACILITIES and equipment, including:

(a) appropriate siting of odour-generating equipment relative to prevailing winds and neighbouring occupancies

(b) effective ventilation

(c) use of WEATHERTIGHT openings, where appropriate

(d) ducting to direct offensive odours to specified target areas, where deemed appropriate

.9 BIO-ENERGY pipes must have a flame arrester safety device placed in an appropriate placement (eg. just after the gate valve at the digester) to prevent any flame from traveling down the gas pipe into the gas storage tank or digester and cause an explosion.

.10 Engine room floors must be at or above ground level to avoid the buildup of heavier-than-air gases and be vented at its highest point to allow lighter-than-air gases to escape.

.11 The engine exhaust pipe must extend to release potentially dangerous exhaust gases to outside the structure.

H4.D Water Based Energy

.1 Any scale of hydroelectric.wave or tidal power system must have an approved Environmental Impact Assessment prior to being considered for a BUILDING PERMIT.

.2 Construction and installation of hydroelectric and tidal power systems will require compliance with relevant sections of the NBC, including:

(a) Section B Stability

(b) Section C Fire Protection

(c) Section D Access

(d) Section F Interior (Indoor Air Quality)

(e) Section G Site Servicing and Waste

(f) Section H Climate Change Adaptation - thermal performance, energy efficiency

(g) Section K **Minor Structures** and **Major Infrastructure**

H4.E Fuel Cells and Batteries

.1 All FUEL CELLS and energy storage mechanisms such as batteries used to supply energy to BUILDINGS, FACILITIES and SITES must have certification verifying safety requirements by an accredited agency.

.2 Installation and usage of FUEL CELLS as an energy source for electricity, heating and cooling in a BUILDING or FACILITY will require compliance with relevant sections of the NBC, including:

(a) Section B Stability

(b) Section C Fire Protection

(c) Section E Hazardous Substances (regarding storage of hydrogen gas supply and battery components)

(d) Section G Site Servicing and Waste (electrical)

(e) Section H Climate Change Adaptation - thermal performance, energy efficiency

.3 A FUEL CELL connected to the local utility grid must meet interconnection requirements of the Samoa Electrical Power Corporation (EPC), as well as the following:

(a) IEEE 1547 Standard for Interconnected Distributed Resources with Electric Power Systems

(b) IEEE 1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems

.4 Separation distance for hydrogen storage systems must meet separation distances specified in NFPA 2 Hydrogen Technologies Code 2011 edition (13.75 m).

.5 FUEL CELLS and energy storage mechanisms such as batteries must be installed in a well-ventilated enclosure that:

(a) allows air-intake at the bottom of the enclosure and air out-take at the highest point

(b) is constructed of FIRE-RESISTANT materials

(c) uses fans, where additional ventilation is needed

(d) has a concrete base, or equivalent acceptable to the Government of Samoa

(e) has a mounted stand so that batteries and FUEL CELLS do not sit directly on the base

(f) access / safety signs-Section E3 Hazardous Substances-Emergency Planning and Warning Signs

(g) has a disconnection switch or quick-disconnect fuse near the FUEL CELL and/or batteries so they can be electrically isolated from the rest of the system

H4.F Other Renewable Sources of Energy

.1 RENEWABLE ENERGY sources not listed in the NBC must be assessed as an ALTERNATIVE SOLUTION in accordance with procedures in Section A, and subject to all parts of the NBC.

ACCEPTABLE SOLUTIONS

AS 4777: 2005 Grid Connection of Energy Systems via Inverters Series

Solar and Wind Power
AS 1657 1992 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction and Installation
AS 2369.1-1990 Materials for Solar Collectors for Swimming Pool Heating – Rubber Materials
AS 2369.2-1993 Materials for Solar Collectors for Swimming Pool Heating – Flexible or Plasticized Polyvinyl Chloride

AS 3634-1989 Solar Heating Systems for Swimming Pools
AS 4509: 2009 Stand-Alone Power Systems Series
AS 4777.3: 2005 Grid Connections Of Energy Systems Via Inverters
AS 61400.21-2006 Wind Turbines – Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines
IEC 61400-22 Ed. 1.0, Wind Turbines – Part 22: Conformity Testing and Certification.

AS/NZS 1170.2: 2011 Structural Design Actions, Part 2: Wind Loads
AS/NZS 1664.1: 1997 Aluminium Structures
AS/NZS 2535.1:2007 Test Methods for Solar Collectors – Thermal Performance of Glazed Liquid Heating Collectors Including Pressure Drop (ISO 9806-1:1994, MOD)
AS/NZS 2712:2007 Solar and Heat Pump Water Heaters – Design and Construction
AS/NZS 3000: 2007 Electrical Installations (known as the Australian / New Zealand Wiring Rules)
AS/NZS 4234:2008 Heated Water Systems – Calculation of Energy Consumption
AS/NZS 4509.2: 2010 Stand-Alone Power Systems
AS/NZS 4600: 2005 Cold-Formed Steel Structures
AS/NZS 5033: 2014 Installation and Safety Requirements for Photovoltaic (PV) Arrays
AS/NZS 5125.1:2010 Heat Pump Water Heaters – Performance Assessment – Air Source Heat Pump Water Heaters

EN 50521: 2008 Connectors for Photovoltaic Systems - Safety Requirements and Tests

IEC 61215 Ed. 2.0: 2005 Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
IEC 61345 Ed. 1.0, UV Test for Photovoltaic (PV) Modules
IEC 61400 Wind Turbines Series
IEC 61646 Ed. 2.0, Thin-Film Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
IEC 61730: 2016 Photovoltaic (PV) Module Safety Qualification Series
IEC/TS 61836 Ed. 2.0, Solar Photovoltaic Energy Systems – Terms, Definitions and Symbols
IEC 62109: 2010 Safety of Power Converters for Use in Photovoltaic Power Systems Series
IEC 62124 Ed. 1.0, Photovoltaic (PV) stand alone systems – Design verification
IEC 62446 Ed. 1.0, Grid Connected Photovoltaic Systems – Minimum Requirements for System Documentation, Commissioning Tests and Inspection
IEC 62509 Ed. 1.0, Battery Charge Controllers for Photovoltaic Systems – Performance and Functioning.

New Zealand Building Code - Acceptable Solution for Solar Water Heaters (G12 / AS2)

NZ Department of Building and Housing, December, 2009 - Solar Water Heaters

Geothermal Power
AS 4343: 2014 Pressure Equipment Hazard Levels

NZS 2403: 1991 Code of Practice for Deep Geothermal Wells
NZS 2402P: 1987 Code of Practice for Geothermal Heating Equipment
New Zealand Health and Safety Guidelines for Shallow Geothermal Wells 1996
New Zealand Health and Safety Guidelines for Self-Management of Shallow Geothermal Bore Systems 2005

Bio-energy
Technical Guide 08: The Production and Use Of Digestate as Fertiliser
Case Study: Biogas on Your Farm (EECA Guide 6.0)
Information Sheet 31: GHG Reduction Using Biogas Technologies
Report: Code of Practice: for On-Farm Biogas Production and Use (piggeries)

Fuel Cells
AS/NZS 4509: 2009 Battery Enclosure Design
AS/NZS 5026: 2012 The Storage and Handling of Class 4 Dangerous Goods
IEEE 1547 Standard for Interconnected Distributed Resources with Electric Power Systems
IEEE 1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems

ISO 16111: 2008 Transportable Gas Storage Devices -- Hydrogen Absorbed in Reversible Metal Hydride

NFPA 2 Hydrogen Technologies Code 2011 edition (13.75 m)

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- PRODUCT INFORMATION SHEETS for all piping, equipment, pumps and heaters indicating ENERGY EFFICIENCY performance, stability, operations and maintenance

- Required approvals, where appropriate, including an Environmental Impact Assessment

H5 Glazing and Windows - Heat Reduction

REQUIRED PERFORMANCE

THIS SECTION SHOULD BE READ IN CONJUNCTION WITH SECTION B5 GLAZING AND WINDOWS - STABILITY AND SAFETY

.1 THERMAL PERFORMANCE of windows and glazed doors must promote ENERGY EFFICIENCY through:

(a) type of glass used

(b) type of FRAMING material

(c) AIRTIGHT construction

.2 Placement and construction of windows and GLAZING in EXTERNAL WALLS and roofs in BUILDINGS and FACILITIES must not cause harm to humans, adjacent property, and the environment.

.3 GLAZING must have R-VALUES (for GLAZING, frame material, and window size) acceptable to the Government of Samoa to reduce the amount of solar radiation entering through an EXTERNAL WALL or roof.

DEEMED-TO-SATISFY PROVISIONS

H5.A Heat Gain Prevention

.1 Shading of windows and doors with GLAZING must be provided on every BUILDING through any, some, or all of the following:

(a) roof overhang

(b) permanent awning

(c) trees that retain foliage throughout the year

(d) tinted windows

(e) shade cast by adjacent BUILDINGS (that protects the opening between 9:00 am to 5:00 pm daily)

(f) supplementary roof that conforms with AS/NZS 1170.2 Wind Loads , as shown in the example in Figure H6.A.1

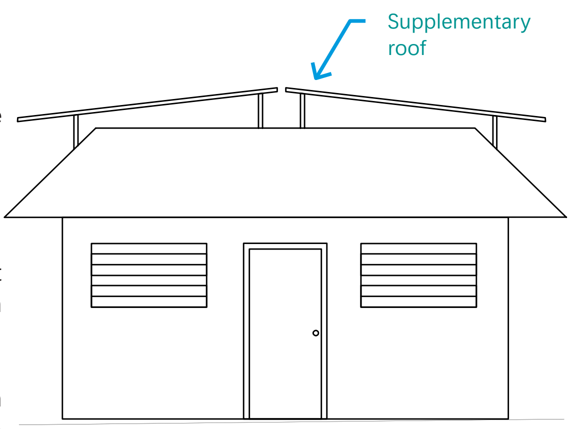


Figure H6.A.1: Supplementary Roof

.2 Exceptions to Section H6.A.1 above include tinted or reflective GLAZING having:

(a) low U-value

(b) low SHGC value (Solar Heat Gain Coefficient)

that are acceptable to the Government of Samoa

.3 All new windows without an opening to the exterior of the BUILDING or FACILITY must be either:

(a) an IGU (Insulated Glass Unit) consisting of double or triple panes of glass with air or approved gas within the gap, and AIRTIGHT seals to the FRAMING, or

(b) tinted and/or reflective GLAZING in conformity with Section H2.G.2 above

.4 Only existing single-pane GLAZING can be retrofitted with secondary GLAZING to improve THERMAL PERFORMANCE, consisting of plastic film, magnetically attached plastic sheet, plain, or low-E glass installed inside the existing glass with a still air gap between it and the existing window.

.5 Louvre openings (glass panels, wood, aluminium) must have low SHGC for all structural members.

H5.B Weather Resilience

.1 Windows must be WEATHERTIGHT with a continuous barrier installed around it, and comply with AS 2047 requirements for resistance to water penetration for the following:

(a) windows in EXTERNAL WALLS

(b) sliding and swinging glazed doors with a frame, including french and bi-fold doors with a frame

(c) adjustable louvres

(d) shopfronts except for open-air markets

(e) CURTAIN WALLS with one piece FRAMING

(f) ROOF LIGHTS

(g) exceptions:
(i) revolving doors
(ii) fixed louvres
(iii) HERITAGE windows

.2 Where windows are fitted onto an external WATERPROOF roof or wall, a sub-sill flashing must be included as part of the membrane system and the external finish must extend beyond the termination of the membrane, with vertical upward termination heights as specified in Table A1 of AS 4654.2-2012, and as illustrated in Figure H6.B.2.

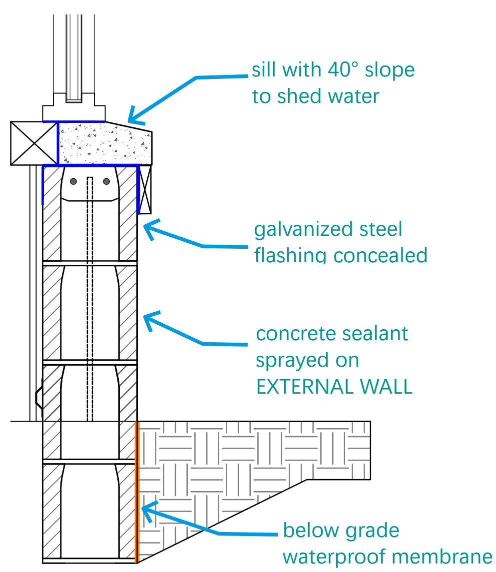


Figure H6.B.2 Example of Waterproof Membrane and Flashing for a Window

ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings – Selection and Installation
AS 2047: 2014 Windows and External Glazed Doors in Buildings - Selection and Installation
AS 2208: 2006 Safety Glazing Materials in Buildings
AS 4420: 2014 Windows - Methods of Test Series
AS 4654.2: 2012 Waterproofing Membranes for External Above-Ground Use - Design and Installation
AS 5039: 2008 Security Screen Doors And Security Window Grilles
AS 5040: 2003 Installation of security screen doors and window grilles

AS/NZS 1170.2: 2011 Structural design actions - Wind actions - Wind loads for Windows
AS/NZS 4667: 2000 Insulating Glass Units

NZS 4223: 2016 Glazing in Buildings

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- PRODUCT INFORMATION SHEET for prefabricated windows, including R-VALUES and environmental performance

H6 Greenhouse Gas Emission Reduction

REQUIRED PERFORMANCE

.1 GREENHOUSE GAS EMISSIONS resulting from the construction, alternation, operation and/or demolition of BUILDINGS, FACILITIES and activities on SITE must be reduced to levels acceptable to the Government of Samoa.

.2 BUILDINGS, FACILITIES, and activities on SITE that generate known GREENHOUSE GASES, such as CO_2 (carbon dioxide), CH_4 (methane), N_2O (nitrous oxide) and fluorinated gases through burning of fossil fuels (wood, oil, gas), industrial processes, use of concrete, and/or energy use, must reduce overall production to levels acceptable to the Government of Samoa by any, some, of all of the following methods:

(a) reduced use of concrete as a BUILDING MATERIAL

(b) use of RENEWABLE ENERGY for lighting, heating, cooling, electricity and industrial processes (see Section H4)

(c) WEATHERTIGHT construction (see Section H2)

(d) ENERGY EFFICIENT lighting, heating, cooling, electricity, GLAZING and industrial processes (see Section H3)

(e) minimising removal of existing healthy trees and plants

(f) conservation of water and energy through low consumption appliances, fixings and machinery

(g) use of recycled and/or locally sourced BUILDING MATERIALS

(h) appropriate siting to reduce solar heat gain (see Section H3)

(i) use of trees and other means of shading BUILDINGS, FACILITIES and amenities on SITE

.3 Any BUILDING, FACILITY or activity on SITE that will produce excessively high, unacceptable emissions of GREENHOUSE GASES, as determined by the Government of Samoa, will have the offensive substances be considered as a HAZARDOUS SUBSTANCE and the provisions in Section E Hazardous Substances will apply.

DEEMED-TO-SATISFY PROVISIONS

H6.A Green Building Materials

.1` BUILDINGS, FACILITIES and SITES must be constructed with BUILDING MATERIALS that are SUSTAINABLE, wherever possible, and achieve the GREEN BUILDING targets listed in Table H7.1.

Table H7.1: Minimum Green Building Targets for Sustainable Building Materials

MINIMUM GREEN BUILDING TARGETS	BUILDING GROUP				
	1	2	3	4	5
Use of 50% locally-produced materials and products	•	•	•	•	•
Use of 90% materials / products with acceptable environmental performance	•	•			
Use of 25% RRR (Reduce, Re-use, Recycle) Materials	•	•	•	•	•
Use of 90% of interior finishes with low VOC (volatile organic compound) potential	•	•	•	•	•

Locally Produced Material
The design of BUILDINGS and FACILITIES must use locally produced BUILDING MATERIAL where appropriate

Materials and Products with ACCEPTABLE Environmental Performance
Acceptable materials and products are any of the following:

(a) materials and products with a recognised and appropriate Eco-label describing the product's environmental performance, or
(b) an EPD label (Environmental Product Declarations), or
(c) other form of third-party verification acceptable to the Government of Samoa.

RRR (Reduce, Re-use, Recycle) Materials
The design of BUILDING and STRUCTURES must incorporate as many existing, salvaged and recycled building parts, assemblies and materials as possible as long as STABILITY and design intent are not compromised.

Low VOC (Volatile Organic Compound) Potential
Interior finishes such as paints, varnishes, floor coverings, and the like, must have product labels indicating acceptable VOC ratings and comply with environmental performance targets in Section F5

H6.B Acceptable Environmental Performance Products

SEE SECTION F5 FOR ENVIRONMENTAL PERFORMANCE OF INTERIOR FINISHES

.1 Materials and products with an acceptable environmental performance must be tested and accredited by a third-party verifier, and issued an Eco-label, an EPD (Environmental Product Declaration) or other certification.

.2 Environmental performance products acceptable to the Government of Samoa are any one of the following:

(a) products listed on the New Zealand Green Building Council (NZGBC) website (https://12253-console.memberconnex.com/Folder?Action=View%20File&Folder_id=98&File=Recognised%20Eco-labels%20IAQ.pdf) regarding:
   (i) approved Eco-Labels
   (ii) FSC labels (Forest Stewardship Council)
   (iii) Enviro-mark NZ Gold products
   (iv) Products with Recycled Content (other than material normally reused in the manufacture of the product)
   (v) CarboNzero Product Certification
   (vi) Declare-labelled products with acceptable environmental performance
   (vii) CEMARS product certification

(b) products listed on the Australian eco-labels website
(www.ecolabelindex.com/eco-labels/?st=country,au)

(c) an approved equivalent acceptable to the Government of Samoa

H6.C GHG Emission Rate Calculations

.1 In addition to demonstrating measures used to reduce GREENHOUSE GAS EMISSIONS listed in Section H6.A and H6.B, BUILDINGS, FACILITIES and activities on SITE in BUILDING GROUP 1-3 (except **Fale Tourist Accommodation**, and **Tourist Accommodation** with less than nine accommodation units) must be designed with GREENHOUSE GAS EMISSION rates acceptable to the Government of Samoa using a recognized GHG calculator (as listed in Section H6.C.2 below), or demonstrate the following:

(a) a low GREENHOUSE GAS EMISSIONS rate (that does not exceed 100 g CO2-e/MJ of thermal energy load for conditioned spaces), and/or

(b) 100% of energy is from a RENEWABLE ENERGY source (Section H5), and/or

(c) effective use of reclaimed energy (energy, such as heat generated from a mechanical system or industrial process, that would otherwise be rejected as waste)

.2 GREENHOUSE GAS EMISSIONS may be calculated using one of the following online calculators, or an equivalent acceptable to the Government of Samoa:

(a) Greenhouse Gas Protocol by World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD)

(b) New Zealand Green Building Council:
(i) Green Star - Education and Industrial Buildings GHG Emissions Calculator
(ii) NABERZ - Commercial Building GHG Emissions Calculator

(c) EnergyStar - Portfolio Manager

(d) Canadian Standards Association - Commercial Buildings Calculator

(e) US EPA - Greenhouse Gas Equivalences Calculator

(f) UK National Energy Foundation - Simple Carbon Calculator - http://www.carbon-calculator.org.uk

.3 BUILDINGS and FACILITIES in BUILDING GROUP 4 and 5 must reduce GREENHOUSE GAS EMISSIONS through the use of ENERGY EFFICIENT lighting, appliances, GLAZING and BUILDING MATERIALS.

.4 For **Multiple Unit Residential Buildings** required to have acceptable GREENHOUSE GAS EMISSIONS, individual UNITS must have an acceptable level achieved using one of the following online calculators or an equivalent acceptable to the Government of Samoa:

(a) UK - Carbon Independent Online Calculator - http://www.carbonindependent.org

(b) US EPA - Household CARBON FOOTPRINT Calculator

ACCEPTABLE SOLUTIONS

AS/NZS 3598-2000, Energy audits
AS ISO 14064.2-2006, Greenhouse Gases – Specification With Guidance at the Project Level For Quantification And Reporting of Greenhouse Gas Emission Reductions and Removal Enhancements (ISO 14062-2:2006, Mod)
AS ISO 14064.3-2006, Greenhouse Gases – Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions
AS ISO 14065-2009, Greenhouse Gases - Requirements for Greenhouse Gas Validation and Verification Bodies for Use in Accreditation or Other Forms of Recognition

ISO 14066-2011, Greenhouse Gases – Competence Requirements for Greenhouse Gas Validation Teams and Verification Teams
ISO 50001:2011, Energy management systems – Requirements with guidance for use

GEMS Greenhouse and Energy Minimum Standards (Electric Water Heaters) Determination 20121, Government of Australia
Greenhouse Gas Protocol by World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD)

Planning for a Stronger, More Resilient North Queensland, Queensland Reconstruction Authority

SR CEN/CLC TR 16103:2010, Energy management and energy efficiency – Glossary of Terms

Calculators
Canadian Standards Association - Commercial Buildings Calculator

EnergyStar - Portfolio Manager

New Zealand Green Building Council - Green Star - Education and Industrial Buildings GHG Emissions Calculator
New Zealand Green Building Council - NABERZ - Commercial Building GHG Emissions Calculator

US EPA - Greenhouse Gas Equivalences Calculator

UK National Energy Foundation - Simple Carbon Calculator - http://www.carbon-calculator.org.uk
UK - Carbon Independent Online Calculator - http://www.carbonindependent.org

US EPA - Household Carbon Footprint Calculator

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved for all BUILDINGS, FACILITIES and SITES
- PRODUCT INFORMATION SHEETS for all heating / cooling equipment demonstrating GHG emission rate, where available

H7 Green Roofs

REQUIRED PERFORMANCE

.1 A GREEN ROOF must, at a minimum, consist of:

(a) a drainage layer to convey excess water to roof drains

(b) a root barrier and filter sheet

(c) a GROWING SUBSTRATE

(d) vegetation

(e) INSULATION where the rooms below will have mechanical air conditioning

and be installed on a WATERPROOF membrane attached to a sufficiently stable roof structure (reinforced concrete or plywood/sheet metal with sufficient FRAMING support) designed to carry the full weight of the GREEN ROOF.

Note: INSULATION may be installed either above the WATERPROOFING membrane as shown or below roof structure

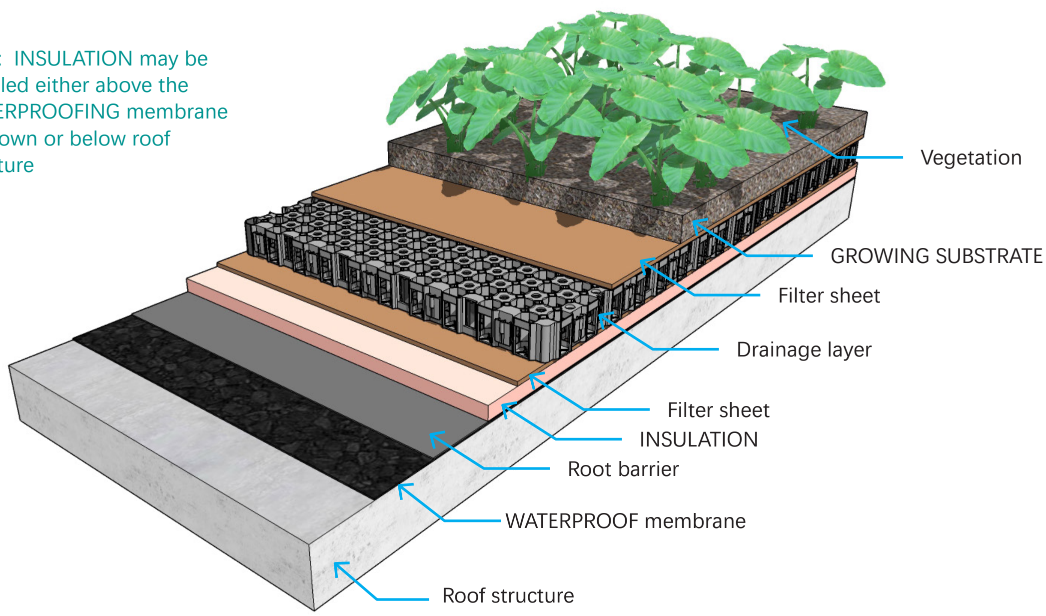


Figure H7.1: Minimum Green Roof Components

.2 To improve THERMAL PERFORMANCE, GREEN ROOFS must be insulated either above or below the roof.

.3 Safety measures must be incorporated into the GREEN ROOF design including:

(a) appropriate roof edge construction

(b) roof materials and fastening appropriate to earthquake loads and weight of GREEN ROOF components

(c) choice of vegetation appropriate to wind loads

(d) roof construction that can support LIVE and DEAD LOADS of the GREEN ROOF when fully saturated with water

(e) ability to effectively and safely convey stormwater in extreme storm events

(f) access

(g) FIRE SPREAD reduction

(h) being WEATHERTIGHT so that water in the GREEN ROOF does not penetrate the roof structure below

.4 GREEN ROOFS must assist in STORMWATER MANAGEMENT by using a porous GROWING SUBSTRATE that collects and absorbs stormwater during the first five minutes of a weather event.

.5 BUILDINGS and FACILITIES may contain one or both of the following GREEN ROOF types, examples of which are shown in Figure H7.5 below:

(a) Extensive GREEN ROOFS - inaccessible to the public, lightweight and low maintenance

(b) Intensive GREEN ROOFS - accessible, more elaborate planting, heavier, more maintenance

Figure H7.5: Examples of Extensive and Intensive Green Roofs

Extensive Green Roof

Intensive Green Roof

H7.A Structural Support and Components

.1 In addition to structural requirements for roofs contained in Section B Stability, GREEN ROOF gravity loads must be calculated:

(a) according to ASTM standard: "ASTM E2397.05 — Standard Practice for Determination of Dead Loads and Live Loads Associated with Green Roof Systems."

(b) with the assumption that the design hydraulic load of the GREEN ROOF system is fully saturated prior to the maximum fifteen-minute rainfall

.2 The density of the GROWING SUBSTRATE must be determined:

(a) in accordance with "ASTM E2399.05 — Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems", or

(b) using an unfactored, saturated density of the GROWING SUBSTRATE of 2,000 kg/m3

.3 All GREEN ROOFS with slopes in excess of 10º (17%) must incorporate anti-shear measures.

.4 Parapets protected by flashing and scuppers must be part of a flat GREEN ROOF design, where required, to allow controlled release of excess stormwater in the event of obstructed or overloaded roof drains in extreme weather events and to protect the roof edge from wind.

.5 Where roof penetrations, intersecting walls, parapets, upturns or mechanical equipment are clad with COMBUSTIBLE materials, a 0.5m wide vegetation-free border zone must abut such features.

.6 Immediately prior to installation of the GREEN ROOF, the roof must be tested to ensure it is WEATHERTIGHT and a report prepared by a PROFESSIONAL CONSULTANT must be submitted and approved by the Government of Samoa that contains the following:

(a) FLOOD test

(b) electric field vector mapping

(c) impedance test

(d) infrared (IR) thermal imaging

(e) low voltage testing

(f) high voltage testing

(g) moisture sensors

.7 The DRAINAGE LAYER must be appropriately sized for effective stormwater retention during extreme weather events according to ASTM E2398-05 Standard Test Method for Water Capture and Media Retention of Geo-Composite Drain Layers for Green Roof Systems, or an equivalent acceptable to the Government of Samoa.

.8 Adequate drainage on a GREEN ROOF (as shown in the examples in Figure H7.A.8(a) and (b)) must be provided by:

(a) installation of a DRAINAGE LAYER (designed specifically for GREEN ROOFS) under the GROWING SUBSTRATE with sufficient height and carrying capacity to convey water at an acceptable rate during extreme weather events

(b) one or more roof drains that convey excess water to the BUILDING'S or FACILITY'S GUTTER, downspout and BUILDING drainage system

(c) a positive slope (1% minimum) to roof drains

(d) minimum 300 mm diameter vegetation-free zone around all roof drains

(e) root penetration barrier beneath the GROWING SUBSTRATE to permit percolation of water to the drainage layer while not permitting roots or soil to pass through

(f) provision of scuppers where a parapet is provided to convey excess stormwater

(g) GROWING SUBSTRATE of sufficient composition and density to allow infiltration of stormwater

Figure H7.A.8(a): Roof Drain on a Flat Green Roof

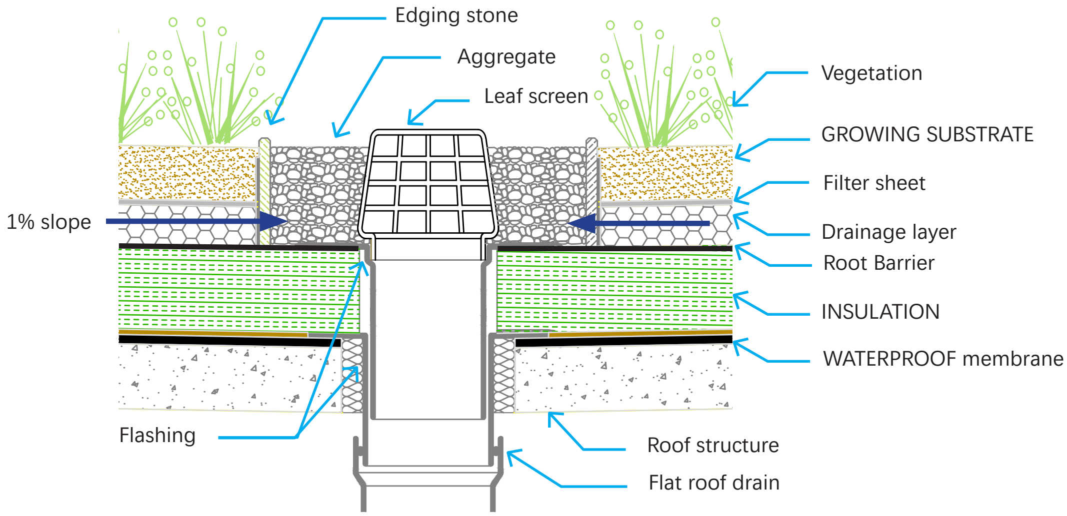
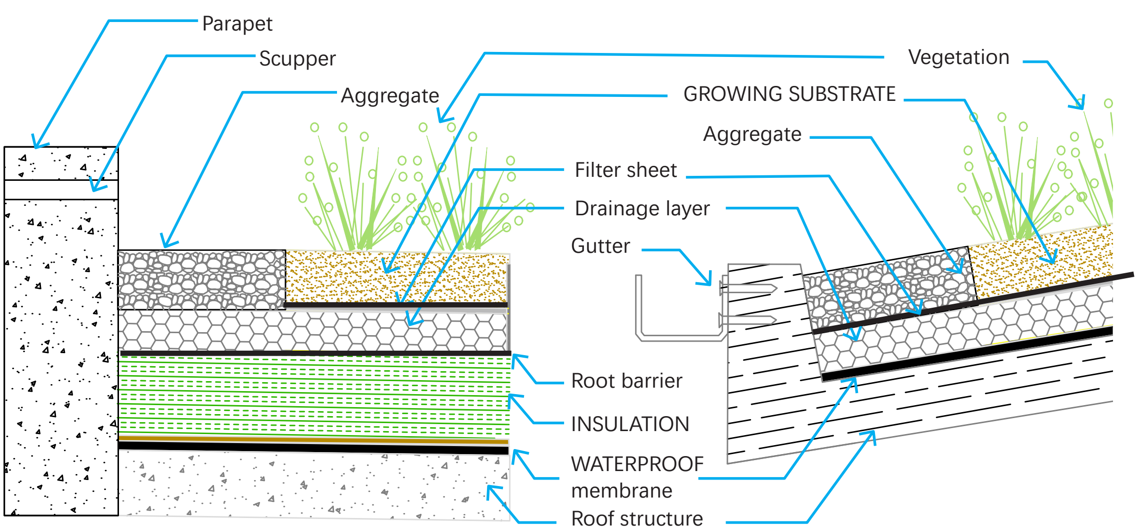


Figure H7.A.8(b): Roof Edge Treatment on an Insulated Flat Green Roof and a Sloping Green Roof



.9 The drainage layer must:

(a) consist of:
(i) rigid synthetic mesh-style, cup-style or other suitable style pre-fabricated sheets designed to convey water under a GROWING SUBSTRATE for a GREEN ROOF, or
(ii) permeable layer of rock aggregate or other suitable inorganic material

(b) be separated from the GROWING SUBSTRATE by filter sheets

(c) be installed as a continuous layer under the extent of the GREEN ROOF

(d) be sized to effectively convey water during extreme weather events

.10 All roof drains must be accessible for maintenance, protected from blockage by leaf litter and substrate wash, and housed with inspection chambers, drain covers, filters or strainers.

.11 WATERPROOFING material must be:

(a) suitable for the type of roof

(b) affixed to the ROOF STRUCTURE

(c) applied treatment or pre-formed WATERPROOFING sheets

(d) certified as root resistant

(e) installed by experienced, trained and certified professionals

.12 Filter sheets (geotextile material) must be made of interwoven fabric and installed with upturns at the edges of the GROWING SUBSTRATE to the height of the GROWING SUBSTRATE.

.13 INSULATION must have an appropriate R-VALUE to protect air-conditioned spaces below the roof.

.14 All pre-fabricated products for GREEN ROOFS, such as drainage or vegetation mats, must have PRODUCT INFORMATION SHEETS describing composition, DURABILITY, environmental impact acceptable to the Government of Samoa.

.15 Except for **Single Unit Residential** and **Regulated Fales**, a maintenance plan for the GREEN ROOF must be prepared and submitted as part of the BUILDING PERMIT application describing:

(a) routine maintenance and inspections sufficient for the LIFESPAN of the BUILDING or FACILITY

(b) specific requirements for the specified GROWING SUBSTRATE and vegetation for vegetation survival

(c) a re-planting program, in the event that re-planting becomes necessary

(d) access and safety

.16 Fire breaks in the form of inorganic material such as loose aggregate must be provided every 40 m.

H7.B Growing Substrate and Vegetation

.1 Vegetation on a GREEN ROOF must:

(a) not include any noxious weeds as identified by the Government of Samoa

(b) be planted at a sufficient density that the vegetation will cover the GROWING SUBSTRATE within approximately 3 months

(c) consist of low-growing, drought-tolerant species that do not present a danger to people or property if uplifted during an extreme weather event

(d) be irrigated, where necessary, to initiate and sustain the vegetation during the LIFESPAN of the GREEN ROOF

.2 Vegetation on a GREEN ROOF must be one of the following:

(a) a prefabricated vegetation mat consisting of plants and GROWING SUBSTRATE on a geotextile base

(b) plant plugs

(c) cuttings and seedlings

(d) seeded by way of hydroseeding or handseeding on low-sloped roofs

Figure H7.B.2: Green Roof Vegetation

Vegetation Mat | Plant plugs | Combined vegetative mat and drainage layer

.3 All pre-fabricated products for GREEN ROOF construction, including vegetation mats, plant plugs, and GROWING SUBSTRATE must have PRODUCT INFORMATION SHEETS describing the composition, DURABILITY and environmental impact acceptable to the Government of Samoa.

.4 Jute anti-erosion netting, or an approved equivalent, must be installed on sloped roofs greater than 15% (3:12 PITCH vertical : horizontal) to assist in the stability of the GROWING SUBSTRATE and vegetation.

.5 GROWING SUBSTRATE must have the following performance standards:

(a) discharge freely to reduce waterlogging and inundation during storm events, but also retain adequate water to sustain plant growth

(b) be lightweight

(c) be stable over its LIFESPAN

(d) be certified as appropriate for a GREEN ROOF, or an equivalent acceptable to the Government of Samoa.

.6 GROWING SUBSTRATE for GREEN ROOFS must contain a mixture appropriate for the type of vegetation including the following:

(a) inorganic material - lightweight aggregate and/or wood chips, perlite, pumice, scoria, coir, lava or crushed brick, stone or tile with a maximum diameter of 9.5 mm

(b) sand

(c) organic compost (maximum 20%)

(d) nutrients

and will **not** contain any portion of topsoil

.7 The infiltration rate of the GROWING SUBSTRATE for an EXTENSIVE GREEN ROOF must achieve:

(a) 1.0 mm/min or 60 l/m2/h for an EXTENSIVE GREEN ROOF

(b) 0.6 mm/min or 36 l/m2/h for an INTENSIVE GREEN ROOF

.8 GROWING SUBSTRATE must adhere to standards in the Growing Green Guide for Melbourne and Victoria (see ACCEPTABLE SOLUTIONS), as shown in Figure H7.B.8 below.

Figure H7.B.8: Growing Substrate Characteristics

Growing Substrate Properties	Extensive Green Roof	Intensive Green Roof
Clay and silt content	<15% by mass	<20% by mass
Proportion of particles > 4mm in diameter	< 50% by mass	< 40% by mass
Organic matter	< 65 g/l and/or 10-25%	< 90 g/l and/or 5–10%
Settling	No more than 10% of nominal depth	Average of <5 cm for substrates at least 50 cm deep
Water permeability	0.6 – 70 mm/min	0.3 – 30 mm/min
Water storage capacity	> 35% by volume	> 45% by volume (maximum of 65%)
Air-filled porosity	> 10%	> 10%
pH	6.0 – 8.5	6.0 – 8.5
Total soluble salts	1.5 – 3.5 g/l	1.5 – 2.5 g/l

.9 Depth of the GROWING SUBSTRATE must be a minimum of 50 mm, and must be appropriate to:

(a) type of vegetation and the rooting system

(b) method of planting (vegetation mats, plant plugs, cuttings, seedlings or seeding)

(c) structural capability of the ROOF STRUCTURE

and at a minimum be designed to store the design storm depth of the 100-year storm or as specified by the Government of Samoa

.10 Mulching must only be applied if secured by a suitable material such as a non-biodegradable mesh.

H7.C Site Furniture and Landscape Material

.1 Any features not part of the GREEN ROOF construction on an INTENSIVE GREEN ROOF, such as planters, benches, gazebos, shade structures, lighting etc., must:

(a) only be used if their design and construction meets wind load and STABILITY requirements of the NBC

(b) be tied, bolted or otherwise permanently affixed to the roof

.2 Topographical variations may be created on INTENSIVE GREEN ROOFS using blocks of polystyrene foam, or an approved equivalent of lightweight material.

.3 Topographical variations on a GREEN ROOF that create different growing conditions and microclimates must be planted with vegetation specific to those conditions.

.4 Planters must be made from any one, some or all of the following weather resistant materials, or an equivalent acceptable to the Government of Samoa:

(a) powder-coated metal

(b) galvanised steel

(c) ceramic

(d) timber

(e) UV stable plastic

(f) glad reinforced concrete (lightweight concrete)

ACCEPTABLE SOLUTIONS

ANSI/SPRI RP-14 Wind Design Standard for Vegetative Roofing Systems

AS 3743: 2003 Potting Mixes Appendix B

ASTM D1987.07 (2016) Standard Test Method for Biological Clogging of Geotextile or Soil/Geotextile Filters
ASTM D4354-12: 2012 Standard Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
ASTM E108-11: 2011 Standard Test Methods for Fire Tests of Roof Coverings
ASTM 2396-11: 2011 Standard Test Method for Saturated Water Permeability of Granular Drainage Media [Falling-Head Method] for Vegetative (Green) Roof Systems (ASTM 2011a)
ASTM E2397-11: 2011 Standard Practice for Determination of Dead Loads and Live Loads Associated with Vegetative (Green) Roof Systems
ASTM E2398-05: 2005: Standard Test Method for Water Capture and Media Retention of Geo-Composite Drain Layers for Green Roof Systems
ASTM E2398-11: 2011: Standard Test Method for Water Capture and Media Retention of Geo-Composite Drain Layers for Vegetative (Green) Roof Systems (ASTM 2011c)
ASTM E2399-11: 2011: Standard Test Method for Maximum Media Density for Dead Load Analysis of Vegetative (Green) Roof Systems (ASTM 2011d)
ASTM E2400-06: 2006: Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems (ASTM 2006)
ASTM E2432-11: 2011 Standard Guide for General Principles of Sustainability Relative to Buildings

ASTM E2777: 2014 Standard Guide for Vegetative (Green) Roof Systems

Auckland Council Technical Report 2013/045 Living Roof Review and Design Recommendations for Stormwater Management, September, 2013

FLL Standard "Guideline for the Planning, Execution and Upkeep of Green-Roof Sites", Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V. – FLL, Colmantstr, Bonn, Germany

Growing Green Guide: A Guide to Green Roofs, Walls and Façades in Melbourne and Victoria, Australia

Specification Sheets from Rooflite for Certified Green Roof Media (Substrate)
Rooflite Extensive Green Roof Certified Green Roof Media
Rooflite Intensive Green Roof Certified Green Roof Media
Rooflite Semi-intensive Green Roof Certified Green Roof Media

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

- PRODUCT INFORMATION SHEETS for the following GREEN ROOF components: drainage layer, vegetation mat, Growing Substrate, root penetration barrier, WATERPROOF membrane, roof drains and INSULATION

Section H CLIMATE CHANGE ADAPTATION

Section J

Natural Disaster Resilience

Contents

Table J1: Section J - Overview of Applicable Sections in the NBC

Section J

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5	Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
J1 General Provisions																
J1.A	Performance Standards for Structural Support	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
J1.B	Cyclone and Tropical Storm Resilience	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
J1.C	Tsunami Resilience	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
J1.D	Earthquake Resilience	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
J1.F	Bushfire Resilience	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A-4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A-2 and A-3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number **and** a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

J NATURAL DISASTER RESILIENCE

Section J OBJECTIVES

J(i)
The design, construction, alteration, operation, maintenance and demolition of BUILDINGS, FACILITIES, and SITES must:

(a) safeguard people, property and site amenities from harm resulting from the following NATURAL DISASTERS:

(i) cyclones and tropical storms

(ii) tsunamis

(iii) earthquakes

(iv) landslips

(v) bushfire

J(ii)
BUILDING PERMIT applications must comply with policies and plans of all agencies and departments of the Government of Samoa whose mandate involves DISASTER RESILIENCE, including:

(a) DMO Disaster Management Office of the MNRE

(b) PUMA Planning and Urban Management Agency of the MNRE

(c) Water and Resources Management division of the MNRE

(d) any other agency or department

J1 General Provisions

REQUIRED PERFORMANCE

.1 Detailed design for a BUILDING PERMIT application must consider all effects of NATURAL DISASTERS appropriate to the location of the SITE, and include architectural/engineering techniques to reduce harmful impacts including, but not limited to:

(a) hydrostatic and hydrodynamic loads

(b) wave action caused by high-velocity floodwaters and/or tsunamis and debris impact

(c) wind load and debris impact

(d) rapid inundation and drawdown of floodwaters and/or tsunamis

(e) prolonged inundation by floodwaters and/or tsunamis

(f) alluvial fan FLOODING

(g) flood and wave-related erosion, scour, mudslides and landslips

(h) deposition and sedimentation by floodwaters or tsunamis

(i) seismic activity and potential impacts

(j) fire resulting from natural causes

(k) topography and vegetation of site and surrounding lands

.2 EXTERNAL WALLS and roofs on properties prone to one or more NATURAL DISASTERS must be appropriately designed and constructed of BUILDING MATERIALS and ASSEMBLIES that reduce the risk of uplift, resist cyclonic wind forces and debris impact, reduce the spread of fire, and withstand seismic impacts.

.3 In cyclone, tropical storm and tsunami-prone areas, INTERIOR WALLS and ceilings must be designed, fabricated and finished so as not to deteriorate when wet in the event of a failure in a door or window to resist the inundation of water during a cyclone or tsunami.

.4 Properties located in a COASTAL ZONE must comply with provisions in Section H1 Coastal Protection in addition to this section.

J1.A Performance Standards for Structural Support

.1 Design and construction of BUILDINGS, FACILITIES, SITEWORKS and SITE SERVICING in locations prone to one or more NATURAL DISASTERS must use products for structural support, CLADDING, windows and doors that have a PRODUCT INFORMATION SHEET and/or CERTIFICATE OF ACCREDITATION indicating that the product has passed tests to relevant and approved standards to withstand the NATURAL DISASTER, (for example, cyclone-grade rafter ties, FIRE-RESISTANT rated windows, etc.).

.2 Appropriate anchorage of trusses and rafters for properties located in areas subject to cyclones, tropical storms, tsunamis, earthquakes and landslips includes:

(a) bolted metal brackets between the wall and the truss

(b) thin metal straps over the trusses

(c) U-shaped bolts that go over the trusses

(d) other ACCEPTABLE SOLUTION approved by the Government of Samoa

.3 BUILDINGS, FACILITIES and SITES must be designed and constructed to achieve, as a minimum, the performance standards shown in Table J1.3 Disaster Resilience Benchmarks for BUILDING GROUPS. The Performance standards in Table J1.3 can be achieved by complying with the provisions in the NBC and/or other documents listed in ACCEPTABLE SOLUTIONS:

Table J1.3: Disaster Resilience Benchmarks for Building Groups

<table>
<tr><th rowspan="2">DISASTER</th><th rowspan="2">BENCHMARK</th><th colspan="4">PERFORMANCE STANDARDS FOR BUILDING GROUPS</th></tr>
<tr><th>Structures must be located, designed and constructed to withstand impacts without being moved off their foundations but could still be damaged by debris, FLOODING, ground failures, other effects</th><th>Structures must withstand water forces, debris and wave-breaking impacts, earthquake shaking, ground failure and spread of fire without significant structural damage, vertical evacuation</th><th>Structures must be capable of withstanding all impacts and be reoccupied within a few days to weeks after cleanup, minor repairs and restoration of utilities</th><th>Structures must be capable of resisting all expected forces and must have backup emergency systems and utilities that can be used immediately following a DISASTER</th></tr>
<tr><td rowspan="3">Cyclones and Tropical Storms</td><td>Category 1-2 Tropical Cyclone once in any given year - wind speeds averaging 48-85 kts / 55-98 mph</td><td>All BUILDINGS, FACILITIES and activities on SITE</td><td colspan="2">BUILDING GROUP 1-3 and any structure designed as a backup emergency shelter or Tourist Accommodation</td><td>BUILDING GROUP 1-2 and any structure designed as a backup emergency shelter or Tourist Accommodation</td></tr>
<tr><td>Category 3 Severe Tropical Cyclone – once in every 2-4 years - wind speeds averaging 86-110kts/99-127mph</td><td colspan="2">BUILDING GROUP 1-3 and any structure designed as a backup emergency shelter or Tourist Accommodation</td><td colspan="2">BUILDING GROUP 1-2 and any structure designed as a backup emergency shelter or Tourist Accommodation</td></tr>
<tr><td>Category 4-5 Severe Tropical Cyclone - once every six years - wind speeds averaging over 110 kts/127 mph</td><td colspan="4">BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td rowspan="2">Tsunamis</td><td>FLOODING not expected to extend past ground floor</td><td colspan="3">All BUILDINGS, FACILITIES and activities on SITE</td><td>BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td>FLOODING expected to extend past ground floor</td><td colspan="2">BUILDING GROUP 1-3, and any structure designed as backup emergency shelter or Tourist Accommodation</td><td colspan="2">BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td rowspan="3">Earth-quakes</td><td>Medium
Richter Scale of 5 or less</td><td colspan="3">All BUILDINGS, FACILITIES and activities on SITE</td><td>BUILDING GROUP 1-3 and any structure designed as a backup emergency shelter or Tourist Accommodation</td></tr>
<tr><td>Large
Richter Scale of 6 or less</td><td colspan="3">All BUILDINGS, FACILITIES and activities on SITE</td><td>BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td>Extreme
Richter Scale above 6</td><td colspan="4">BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td rowspan="2">Landslides</td><td>BUILDINGS located within 10 m of a steep slope</td><td colspan="3">All BUILDINGS, FACILITIES and activities on SITE</td><td>BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td>BUILDINGS located in designated HAZARD LANDS</td><td>All BUILDINGS, FACILITIES and activities on SITE</td><td colspan="2">BUILDING GROUP 1-3 and any structure designed as a backup emergency shelter or Tourist Accommodation</td><td>BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
<tr><td>Bushfire</td><td>BUILDINGS located in designated bushfire-prone areas</td><td colspan="3">All BUILDINGS, FACILITIES and activities on SITE</td><td>BUILDING GROUP 1- 2 and any structure designed as a backup emergency shelter</td></tr>
</table>

J1.B Cyclone and Tropical Storm Resilience

.1 Site Plans and construction drawings for all properties in Samoa likely to be impacted by a cyclone, tropical storms and/or FLOODING must demonstrate acceptable site and building standards that protect the SITE and occupants as listed in Table J1.B.1, and include details and protective strategies regarding:

(a) protection of existing topography and hydrology, and protection of projected future topographical changes as a result of an increase in extreme weather events from CLIMATE CHANGE

(b) extent of STORM SURGE and FLOODING of inland bodies of water likely to impact the SITE during a cyclone or FLASH FLOOD and associated mitigation strategies

(c) proposed shoreline, riverbank and FLOODPLAIN protection strategies and techniques (natural and/or engineered) and SITE engineering, if applicable, see Section H1 Coastal Properties

(d) location and elevation of BUILDINGS and FACILITIES in relation to the projected FLOODING of the SITE

(e) details of BUILDING and FACILITY foundations and structural support (including materials, connections and methods) relative to expected FLOODING

(f) soil conditions (type, depth, location) and engineered solutions to enhance soil structure

.2 All metal roofing must be designed to resist fluctuating wind loads that cause fatigue and reduce its strength during a cyclone. Metal roofing systems (roofing, fasteners and battens) must use material with acceptable LHL (low-high-low) test results as noted on specifications and plans referencing the manufacturer, demonstrate the performance indicated in Table J1.B.3 below (known as Specification B1.2 Design of Buildings in Cyclonic Areas in the Building Code of Australia, Volume 1).

.3 In addition to Section J1.B.2 above, BUILDING MATERIAL and ASSEMBLIES must comply with wind and structural load standards in AS/NZS 1170.

.4 Metal roof CLADDING systems must be capable of remaining in position notwithstanding any permanent distortion, fracture or damage that might occur in the sheet or fastenings under the pressure sequences A to G in Table J1.B.3

Table J1.B.3: LHL (Low-High-Low) Pressure Sequence During a Cyclone

Sequence	Number of Cycles	Load
A	4500	0 to 0.45 Pt
B	600	0 to 0.6 Pt
C	80	0 to 0.8 Pt
D	1	0 to 1.0 Pt
E	80	0 to 0.8 Pt
F	600	0 to 0.6 Pt
G	4500	0 to 0.45 Pt

Notes:

1. Pt is the ultimate limit state wind pressure on internal and external surfaces as per AS/NZS 1170.2, modified by an appropriate factor for variability, as determined in according with Table B1 of AS/NZS 1170.0.

2. The rate of load cycle must be less than 3Hz.

3. The single load cycle (Sequence D) must be held for a minimum of 10 seconds).

Table J1.B.1: Cyclones and tropical storms - structure, material and construction provisions

cyclones
tropical storms

MINIMUM REQUIREMENTS FOR ALL PROPERTIES IN SAMOA

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5
BUILDING location	Away from COASTAL ZONES	•	•			
	Finished ground floor above COASTAL FLOOD LEVEL or DESIGN FLOOD LEVEL	•	•	•	•	•
	On highest elevation			•	•	•
BUILDING shape	Shaped to deflect high winds (square, rectangular, or the like)	•	•			
	Simplified shape	•	•	•	•	
BUILDING form and material	Roof-to-foundation reinforced concrete only	•				
	Roof-to-foundation reinforced concrete/ masonry / FRAMING,	•	•	•	•	•
	DECKS and verandas, where used, must be integral, detached from BUILDING,or attached with a separate roof fastened to the EXTERNAL WALL	•	•	•	•	•
Site Improvements	Major earthwork to redirect STORM SURGE, reduce wind damage	•				
	Earthwork to redirect STORM SURGE, reduce wind damage, where space permits and where appropriate	•	•	•	•	•
	Plant vegetative buffers to block wind, reduce STORM SURGE	•	•	•	•	
	Catchment areas - SOAKPITS, DRAINAGE DITCH, bioswales, and/or STORMWATER MANAGEMENT ponds (see Section B2.D)	•	•	•	•	•
	Slope stabilisation and preservation (mangroves, forests, dunes)	•	•	•	•	•
Foundations	Continuous reinforced concrete slab with footing, concrete slab with pile footings, or reinforced concrete stepped foundation on slope (must also comply with Section H1 Coastal Protection)	•	•	•	•	
	Reinforced concrete footings under posts along with LOAD-BEARING WALLS, open or closed under lowest floor		•	•	•	•
	Traditional buried wood posts with concrete footings sized for soil type, and main floor located above expected STORM SURGE					•
Walls	WEATHERTIGHT	•	•	•	•	
	OPEN FALE or WEATHERTIGHT closed FALE walls					•
	Secure walls to roof and foundation with cyclone-grade ties	•	•	•	•	•
	Reinforced concrete, concrete block, reinforced FRAMING, or sufficient sheet metal thickness to withstand cyclonic wind forces	•	•	•	•	•
	CLADDING fastened with adequate and frequent cyclone fasteners			•	•	•
Roof	PITCH of 22° to 35° or reinforced flat roof	•	•	•	•	
	Hip roof or reinforced flat roof	•	•	•	•	
	Variety of roof styles, including small gables, cupolas, mansard				•	•
	Maximum 30cm overhang (without post support)	•	•			
	Maximum 45cm overhang (without post support)			•	•	
	Traditional roof construction and/or sufficiently sized cyclone-grade metal roof with adequate and frequent cyclone fasteners			•	•	•
Windows and doors	Doors and windows attached to FRAMING with strong holdfasts	•	•	•	•	•
	Windows placed on opposite sides to promote cross ventilation	•	•	•	•	
Site Servicing	Emergency back-up required (water, waste, energy)	•	•	•		
	Protective measures required to resist impact of cyclones (adequate fastening, INSULATION, shut-off mechanisms, proper placement)	•	•	•		

Figure J1.B.4: Cyclone Resistant Foundations

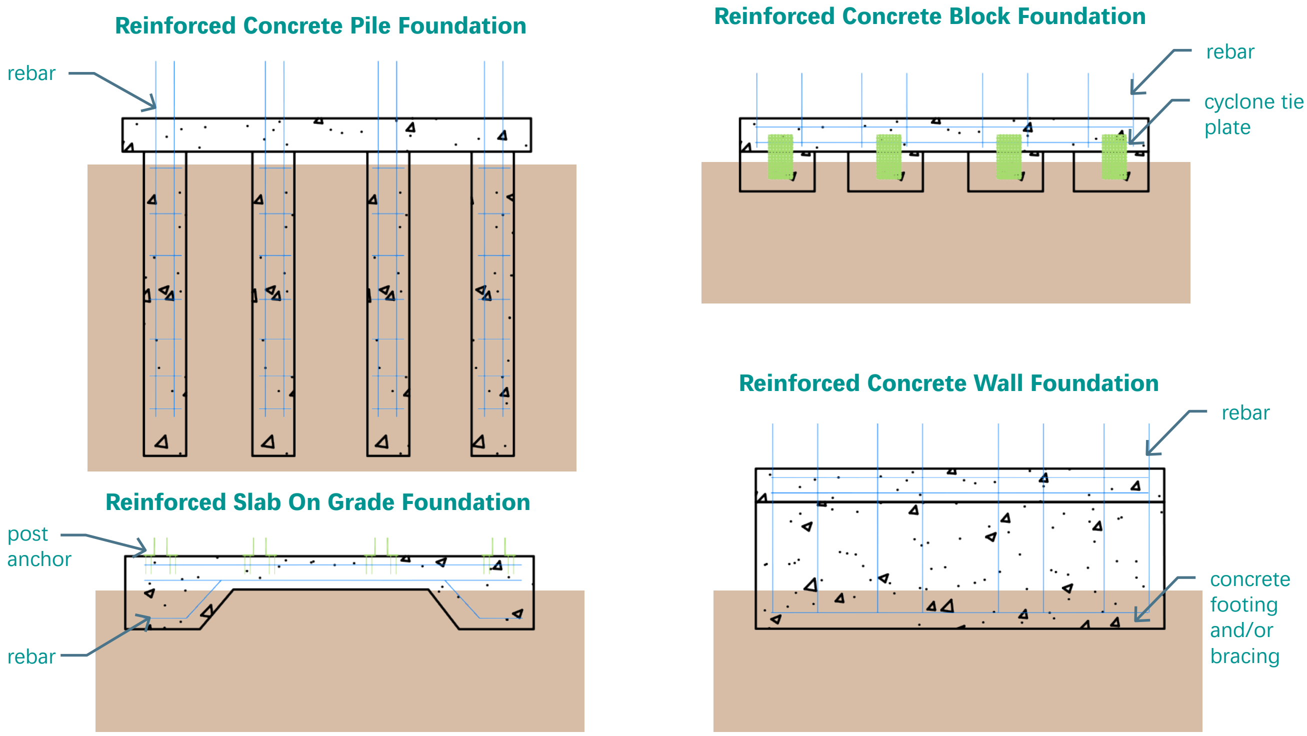


Figure J1.B.5: Cyclone Ties for Framing - Roof to Foundation

__Figure J1.B.6: Roof Types__

Gable Roof

Hip and Valley Roof

Rounded Traditional Roof

Faleo'o Roof

Multiple Roof Types -
gable, shed, hip and hexagonal

J1.C Tsunami Resilience

THIS SECTION SHOULD BE READ IN CONJUNCTION WITH SECTION H1 COASTAL PROTECTION

.1 BUILDING PERMIT and construction (tender) drawings for properties located near the shoreline that are likely to be impacted by a tsunami, STORM SURGE or coastal FLOODING are deemed to be within a COASTAL ZONE and must demonstrate the site and building standards listed in Table J1.C.1, and include details and protective strategies regarding:

(a) existing coastline, and expected location of coastline 10 and 20-years in future

(b) projected water path from a tsunami with a 1.0 m, 5.0 m and 10.0 m wave height

(c) periodic FLOODING resulting from STORM SURGE from tropical storms, RUNOFF and overflow from higher elevations, and high WATER TABLES

(c) proposed shoreline protection measures (natural and/or engineered) and site engineering

(d) location and elevation of BUILDINGS and FACILITIES in relation to the projected water path of tsunami

(e) details of BUILDING and FACILITY foundations and structural support (including materials, connections and methods) relative to expected water path and volume

(f) soil conditions (type, depth, location) and engineered solutions to enhance soil structure

(g) COASTAL FLOOD LEVEL

.2 Other than BUILDING GROUP 5, BUILDINGS and FACILITIES must not be constructed of timber if located within 3.0m vertical distance from high tide level and/or located within 300 m of the shoreline for those locations to avoid the possibility of timber structures becoming dangerous debris during a tsunami, except **Open Fale (faleo'o)** or **Fale Tourist Accommodation**.

.3 Breakwalls constructed to resist potential tsunami waves or coastal FLOODING, or other retaining structures must not have a steep downslope or any other form that enables the tsunami wave to pick up speed as it travels inland, and must comply with Section K2.C Seawalls.

.4 Siting and foundations of BUILDINGS and FACILITIES near the coastline must be constructed for DISASTER RESILIENCE from tsunamis by:

(a) having building form, massing and location of openings with side-sway resistance

(b) being firmly fixed to firm ground through appropriate choice of:
- (i) foundation (pylon, wall, steel crib) given the soil conditions, topology and coastline characteristics
- (ii) reinforcement (bracing, steel mesh embedded into concrete, rebar, etc.)
- (iii) footing depth

(c) locating BUILDING or FACILITY with the short-side facing the coastline and the structure orientation at an angle to the coastline to reduce the impact of the tsunami wave on the structure

(d) having continuous connections from foundation to supporting columns and/or continuous walls, to roof including steel reinforcement

(e) creating breakwalls, vegetated berms, mangroves or other rough ground to provide a barrier between shoreline and BUILDINGS, FACILITIES and activities on SITE requiring protection massing with no openings

.5 Structures with flat roofs in BUILDING GROUP 1-2 and **Office**, **Commercial**, **Industrial** and **Assembly** structures in BUILDING GROUP 3 must provide a FIRE-RESISTANT EVACUATION ROUTE to the roof if located within an area likely to be impacted by a tsunami.

Table J1.C.1: Tsunamis- structure, material and construction provisions

tsunamis

MINIMUM STANDARDS FOR PROPERTIES IN COASTAL AREAS

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5
BUILDING location	Away from COASTAL ZONE	•	•			
	Finished floor elevated minimum of 1.0 m above COASTAL FLOOD LEVEL, and/or earthwork to divert water from BUILDING	•	•	•	•	•
	On highest elevation			•	•	•
BUILDING shape	Elongated with short side facing shoreline	•	•	•	•	
BUILDING form and material	Roof-to-foundation reinforced concrete only, or equivalent	•				
	Roof-to-foundation reinforced concrete, masonry, or reinforced FRAMING		•	•	•	•
	Reinforced concrete and steel for all parts subject to inundation	•	•	•		
Site Improvements	Earthwork and walls that reduce soil saturation and instability	•	•	•	•	•
	Adequate SETBACK from slopes that could become unstable	•	•	•	•	•
	Berms/ terraced slopes/ walls/ DRAINAGE DITCH to slow water and steer it to a less harmful location	•	•	•	•	•
	Berms/ terraced slopes/ walls/ parking structure to block water	•	•	•	•	•
	Slope stabilisation and natural area preservation	•	•	•	•	•
Foundations	Elevated FINISHED FLOOR with timber or concrete footings or piles, and diagonal bracing					•
	Elevated FINISHED FLOOR with concrete footings and permeable walls (lattice, screen, louvres)					•
	Masonry walls with vents or other openings to permit passage of STORM SURGE	•	•	•	•	•
	Concrete slab on grade foundation on constructed fill with FINISHED FLOOR above COASTAL FLOOD LEVEL	•	•	•	•	•
	Foundation walls engineered as a SEAWALL and subject to Section K2.C Seawalls	•	•			
Walls	OPEN FALE or closed FALE walls					•
	Reinforced concrete, masonry, or reinforced FRAMING designed to withstand water pressure and breaking wave force	•	•	•	•	
	Sufficient sheet metal thickness or wood CLADDING, with adequate and frequent fasteners		•	•	•	•
Roof	Escape route to roof	•	•	•		
	Maximum 30cm overhang (without post support)	•	•			
	Maximum 45cm overhang (without post support)			•	•	
	Traditional roof construction and/or sufficiently sized metal roof with adequate and frequent fasteners					•
Windows and doors	Doors and windows attached to FRAMING with strong holdfasts	•	•	•	•	
	Sufficient windows and doors to allow water to enter and pass through structure	•	•	•	•	•
SITE SERVICING	Emergency back-up required (water, waste, energy)	•	•	•		
	Protective measures required to resist impact of tsunami (adequate fastening, isolation, INSULATION, placement above COASTAL FLOOD LEVEL)	•	•	•	•	

J1.D Earthquake Resilience

.1 BUILDING PERMIT and construction (tender) drawings for properties located in earthquake-prone areas (as identified/ recognised by the Government of Samoa) that are likely to be impacted by an earthquake must demonstrate acceptable site and building standards that protect the SITE and occupants as listed in Table J1.D.1, and include details and protective strategies regarding:

(a) existing topography of the SITE and surrounding area, identifying any areas susceptible to erosion, earth loosening or other disturbance as a result of an earthquake

(b) projected path for soil movement, erosion and landslips if an earthquake was to occur

(c) proposed soil stabilisation and ground shaking protection (natural and/or engineered) and site engineering

(d) location and elevation of BUILDINGS and FACILITIES in relation to any areas with the potential for erosion

(e) construction details of BUILDING and FACILITY foundations and structural support (including materials, connections and methods) relative to expected earth movement as a result of different scales of earthquakes

(f) soil conditions (type, depth, location) and engineered solutions to enhance soil structure

.2 Allowable seismic stress calculations as detailed in AS/NZS 1170.4 and .5 must verify that the lateral seismic shear for expected earthquake motions does not exceed the ability of the structure to support the load based on the height, length, width, BUILDING MATERIALS of the structure along with SITE characteristics.

.3 Where an extreme earthquake (up to 7.0 on the Richter Scale) is likely, the structural design of BUILDINGS, FACILITIES and activities on SITE, and their location on SITE must provide an adequate level of protection for occupants in the event of collapse.

.4 Similar high quality connections used in cyclonic architecture to tie together floors, foundations, walls and roofs must be used in earthquake-prone areas of Samoa, including:

(a) adequate sized and reinforced foundations that can carry the load of the structure in addition to seismic forces as indicated in AS/NZS 1170.4 and .5, and can resist uplift forces from cyclonic winds as indicated in AS/NZS 1170.2, and are connected from foundation to roof, including:
- (i) adequately sized and spaced connections in steel frame construction
- (ii) roof to foundation reinforcement in masonry structures
- (iii) hurricane ties (cyclone ties) for timber FRAMING at all connections between posts, joists, beams and, rafters

(b) adequately sized roof sheeting with adequately sized and spaced ties

.5 For BUILDING GROUP 5, any, some, or all of the following four bracing configurations of the IRC (International Residential Code) must be used in earthquake-prone areas of Samoa:

(a) braced wall panels (IRC Section R602.10.3)

(b) continuous (wood) structural panel sheathing (IRC Section R602.10.5)

(c) alternate braced wall panels (IRC Section 602.10.6)

(d) wood structural panel sheathed walls with hold-down connections as required by the exceptions in IRC Section R703.7

Table J1.D.1: Earthquakes - structure, material and construction provisions

earthquakes

MINIMUM STANDARDS FOR ALL PROPERTIES IN SAMOA

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5
BUILDING location	Minimum 18m from known fault lines	•	•	•	•	•
	Prepare geotechnical report - choose best location for seismic design of foundation considering soil bearing capacity	•	•	•		
BUILDING shape	Simple, rectangular shape with equal distribution of LOAD-BEARING WALLS / posts, length-to-width ratio of 4 or less	•	•	•		
	No split-levels or other level offsets	•	•	•		
	Additional reinforcement where wings adjoin main BUILDING or separation	•	•	•	•	•
	Similar massing on opposite sides of the BUILDING	•	•	•	•	•
BUILDING form and material	Roof-to-foundation reinforced concrete	•				
	Roof-to-foundation reinforced concrete / masonry / FRAMING / confined masonry with tie beams (3m apart max.) and columns (4m apart max.) for BUILDINGS up to 4 STOREYS in HEIGHT		•	•	•	
	Floor and roof openings minimised	•	•	•		
	Horizontal (plinth, lintel roof/floor bands) and vertical load paths	•	•	•	•	
Site Improvements	In highly prone areas, locate trees far from BUILDING	•	•	•	•	•
	Layered, ENGINEERED FILL installed in cut-and-fill situations	•	•			
	Grading for positive drainage away from BUILDING	•	•	•	•	•
	Slope stabilisation and natural area preservation	•	•	•	•	•
Foundation	Concrete slab with piles or other method in sandy/soft clay or expansive soils with high WATER TABLE to counteract soil liquification	•	•	•	•	•
	Secure foundation / footing to wall and roof with reinforcement	•	•	•	•	•
	Foundation and footing size according to soil bearing capacity	•	•	•	•	
	Maximum 1.2m of foundation wall above grade	•	•	•	•	•
	Traditional buried wood posts with concrete footings sized for soil type					•
Walls	Continuous EXTERNAL WALLS secured from roof to foundation (eg. bracing walls, hold-down straps, rebar)	•	•	•	•	•
	Similar wall stiffness (strength) on multi-storey BUILDINGS	•	•	•	•	•
	Concrete walls sized to reduce weight according to standards	•	•	•	•	
	Framed walls to have additional bracing, fasteners, corner connections	•	•	•	•	•
	OPEN FALE or closed FALE walls					•
Roof	Sloping roofs with rafters and sheet metal covering	•	•	•	•	
	Sloping roofs with rafters and sheet metal or tile covering			•	•	
	Traditional roof construction and/or sufficiently sized metal roof with adequate and frequent fasteners					•
Windows and doors	Doors and windows attached to FRAMING with strong holdfasts	•	•	•	•	
	Windows stacked vertically	•	•	•		
	Windows and doors placed 1.0m min. from corners	•	•	•	•	•
SITE SERVICING	Emergency back-up required (water, waste, energy)	•	•	•		
	Protective measures required to resist impact of earthquakes, including adequate fastening, isolation, INSULATION, etc.	•	•	•	•	

J1.E Landslip Resilience

.1 BUILDING PERMIT and construction (tender) drawings for properties located in landslip-prone areas and/or Hazard Lands as identified by the Government of Samoa that are likely to be impacted by a landslip must demonstrate acceptable site and building standards that protect the site and occupants as listed in Table J1.E.1, and include details and protective strategies regarding:

(a) existing topography of the SITE and surrounding area, identifying any areas susceptible to erosion, earth loosening or other disturbance as a result of the topography of the SITE and in the surrounding area

(b) projected path soil movement if a landslip was to occur

(c) proposed soil stabilisation and erosion protection (natural and/or engineered), and site engineering

(d) location and elevation of BUILDINGS and FACILITIES in relation to areas susceptible to erosion and proposed SETBACKS based on projections for land slippage for 10, 25 and 50 year projections

(e) construction details of BUILDING and FACILITY foundations and structural support (including materials, connections and methods) relative to expected earth movement as a result of land slippage

(f) soil conditions (type, depth, location) and engineered solutions to enhance soil structure

.2 Retaining walls or other slope retention techniques constructed to resist potential landslips must be constructed according to Section B2 Siteworks in addition to provisions in this section.

.3 Siting and foundations of BUILDINGS and FACILITIES sited in close proximity to an area with the potential for land slippage must:

(a) have built form, massing and location of openings that provide resistance to additional loads that could occur as a result of landslips

(b) be firmly fixed to stable ground through appropriate choice of:
- (i) foundation (pylon, wall, steel crib) given the soil conditions, topology and hydrology characteristics
- (ii) reinforcement (bracing, steel mesh embedded into concrete, rebar, etc.)
- (iii) adequate footing depth to provide support if a landslip occurs

(c) locate BUILDING, FACILITY or activities on SITE either:
- (i) a sufficient distance from the area prone to land slippage that no harm to the structure or occupants is likely to occur, or
- (ii) with a combination of sufficient SETBACK and slope stabilisation techniques that result in no harm to the structure or occupants likely to occur

(d) locate BUILDING or FACILITY with the long-side facing the area prone to a landslip and the structure orientation at an angle to the landslip area to reduce the impact of potential soil redistribution on the structure

(e) have continuous connections from foundation to supporting columns and/or continuous walls, to roof including steel reinforcement

Table J1.E.1: Landslips - structure, material and construction provisions

landslips

MINIMUM STANDARDS FOR PROPERTIES WITHIN DESIGNATED LANDSLIP PRONE AREAS

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5
BUILDING location	Adequate SETBACK from cliffs and steep hills that are > 30% slope	•	•	•	•	•
	SITING of BUILDING or FACILITY avoids areas prone to landslips, rockfalls, slumps, earth flows and mudflows	•	•	•	•	•
	Where building into slope cannot be avoided, create adequate sized table land for BUILDING with cut and fill and/or build into shallowest part of slope	•	•	•	•	•
BUILDING shape	Longest side of BUILDING parallel with the slope unless a sufficient SETBACK is maintained	•	•	•	•	•
BUILDING form and material	Roof-to-foundation reinforced concrete, masonry or reinforced FRAMING	•	•	•	•	
Site Improvements	Existing vegetation maintained as much as possible	•	•	•	•	•
	Slope stabilisation where danger is likely	•	•	•	•	•
	Water regime maintained / water diverted away from slope	•	•	•	•	•
	Bare slopes re-vegetated / structurally reinforced	•	•	•	•	•
	Amend loose, clay or sandy soils, make more structurally sound	•	•	•	•	•
	New cut and fill / berms / slopes stabilised and compacted	•	•	•	•	•
	Sedimentation reduced through earthworks (terracing, retaining walls)	•	•	•	•	•
Foundations	Subsurface drainage / dewatering for foundation walls built into slope	•	•	•	•	•
	Stepped foundations, reinforced concrete slab with pile foundations, raised concrete slab with engineered footings	•	•	•	•	
	Traditional buried wood posts with concrete footings sized for soil type, and elevated main floor					•
Walls	BUILDINGS built into a slope must have walls constructed to the same standards for earthquakes (see Section J1.C) regarding design, layout, strength and DURABILITY	•	•	•	•	
Roof	RUNOFF directed to area that will not contribute to foundation erosion or slope instability	•	•	•	•	•
	BUILDINGS built into a slope must have roofs constructed to the same standards for earthquakes regarding design, layout, strength and DURABILITY	•	•	•	•	
Windows and doors	Adequate windows and doors for EMERGENCY EXITS	•	•	•	•	•
SITE SERVICING	Emergency back-up required (water, waste, energy) for BUILDINGS built into a steep slope	•	•	•		
	Protective measures required to resist impact of landslips including adequate fastening, etc.	•	•	•	•	

J1.F Bushfire Resilience

.1 BUILDING PERMIT and construction (tender) drawings for properties located in designated bushfire-prone areas as identified by the Government of Samoa that are likely to be impacted by a bushfire must demonstrate acceptable site and building standards that protect the site and occupants as listed in Table J1.F.1, and include details and protective strategies regarding:

(a) existing topography of the SITE and surrounding area, identifying any areas that are potential sources of fire or from which fire could spread to BUILDINGS, FACILITIES or activities on SITE

(b) projected spread of bushfire across the SITE

(c) proposed FIRE SAFETY SYSTEM and site engineering to reduce spread of fire

(d) location and elevation of BUILDINGS and FACILITIES in relation to bushfire-prone areas and the path of the likely spread of fire, including SETBACKS

(e) construction details of BUILDING and FACILITY foundations and structural support (including materials, height of underside of lowest floor from ground level) relative to expected bushfire spread and any fire protection mechanisms

(f) soil conditions (type, depth, location) and hydrology

.2 Stand-alone fire protection structures, such as a FIRE WALL or bushfire shelter, etc., must be constructed according to Section B2 Siteworks and Section C Fire Protection in the NBC, and according to Section P2.3.5 of the Building Code of Australia, Volume 2, for bushfire shelters. .

.3 Siting and foundations of BUILDINGS and FACILITIES with the potential for impacts from bushfire must:

(a) have building form, massing and location of openings that reduce the spread of fire

(b) locate BUILDING, FACILITY or activities on SITE either:

(i) a sufficient distance from the area prone to bushfire that no harm to the structure or occupants is likely to occur, or

(ii) with a combination of sufficient SETBACK and FIRE RESISTING construction techniques that result in no harm to the structure or occupants likely to occur

.4 Design and construction of **Residential** homes in BUILDING GROUP 4 and 5 in designated bushfire-prone areas must use the construction methods outlined in Table J1.F.4 below, along with requirements of Table J1.F.1 Bushfire on the next page, to resist the spread of fire:

Table J1.F.4: Fire Retardant Treatment for Single Family Residential in Bushfire Areas

	Bushfire Attack Category		
	Medium	**High**	**Extreme**
Timber Bearers, Joists, Flooring, Verandahs and Decks			
> = 600 mm above ground	No Treatment Required	No Treatment Required	If floor is not enclosed it must be FIRE RETARDANT Treated or sheeted underneath with a NON-COMBUSTIBLE material
< 600 mm above ground	FIRE RETARDANT Treated	FIRE RETARDANT Treated	FIRE RETARDANT Treated
Sheet Cladding as External Walls			
> 400 mm above ground	No Treatment Required	FIRE RETARDANT Treated	FIRE RETARDANT Treated
< = 400 mm above ground	FIRE RETARDANT Treated, or covered by or substituted with NON-COMBUSTIBLE material	FIRE RETARDANT Treated	FIRE RETARDANT Treated

Table J1.F.1: Bushfire - structure, material and construction provisions

bushfire

MINIMUM STANDARDS FOR ALL PROPERTIES IN DESIGNATED BUSHFIRE-PRONE AREAS

		Building Group 1	Building Group 2	Building Group 3	Building Group 4	Building Group 5
BUILDING location	Away from prevailing winds	•	•	•	•	•
	Away from potential fire sources	•	•	•	•	•
	Elevated, away from valleys and depressions	•	•	•	•	•
BUILDING shape	EMERGENCY EXITS and stairs as per Section C: Fire Protection	•	•	•	•	
BUILDING form and material	Roof-to-foundation reinforced concrete only	•				
	Roof-to-foundation reinforced concrete, masonry or NON-COMBUSTIBLE material		•	•	•	•
	Reinforced FRAMING with low ignition rate (bushfire resistant)			•	•	•
Site Improvements	Planting / earthwork to block prevailing winds	•	•	•	•	•
	Vegetation management to reduce fire risk	•	•	•	•	•
	Surround BUILDING with low-grade COMBUSTIBLE material (eg. irrigated lawn, gravel, stone, paving, etc.)	•	•	•	•	•
Foundations	Foundations and lowest FINISHED FLOOR elevated to reduce likelihood of BUILDING catching fire	•	•	•	•	•
	Openings in foundation must not allow air to enter first floor unless covered by a window	•	•	•	•	
Walls	WEATHERTIGHT	•	•	•	•	
	OPEN FALE or WEATHERTIGHT closed FALE walls					•
	Reinforced concrete, concrete block, or masonry	•	•	•	•	
	FIRE RETARDANT FRAMING with STUCCO CLADDING, NON-COMBUSTIBLE siding, masonry	•	•	•	•	
	FIRE RETARDANT wood CLADDING, posts, beams, joists, flooring		•	•	•	•
	FIRE RETARDANT sheet CLADDING		•	•	•	•
Roof	Secure ventilation openings that resist intrusion of embers	•	•	•	•	
	Roof covering has low ignition rate	•	•	•	•	
	WEATHERTIGHT	•	•			
	Traditional roof construction and/or sufficiently sized metal roof with adequate and frequent fasteners					•
Windows and doors	NON-COMBUSTIBLE window frames, sills, and other parts in fire-prone areas	•	•	•	•	•
SITE SERVICING	Emergency back-up required (water, waste, energy)	•	•	•		
	Protective measures required to resist impact of bushfire, including adequate INSULATION, isolation, FIRE SAFETY SYSTEM	•	•	•	•	

.5 SITES located in designated bushfire-prone areas used for human habitation that do not have access to a RETICULATED WATER SUPPLY or are sufficiently remote to prevent timely action from EMERGENCY RESPONDERS must have:

(a) an on-site FIRE SAFETY SYSTEM

(b) a sufficient water supply that can be used by trained persons to reduce the spread of fire

ACCEPTABLE SOLUTIONS

The following list must be considered along with other ACCEPTABLE SOLUTIONS in the NBC for stability, fire protection, and CLIMATE CHANGE ADAPTATION

Cyclones and Tropical Storms

AS/NZS 1170.1 and.2: 2002 Structural Design Actions, Part 2 Wind Actions

AS 1684.3: 2010 Residential Timber Frame Construction, Part 3: Cyclonic Areas
AS 4055: 2006 Wind Loads for Housing

A Guide to the Construction of Buildings in Cyclonic Areas: Bracing, Tie-downs and Other Issues, 2014, Queensland Building and Construction Commission

Tsunamis

AS 4654.1: 2009 Waterproofing Membrane Systems for Exterior Use – Above Ground Level – Materials
AS 4654.2: 2009 Waterproofing Membrane Systems for Exterior Use – Above Ground Level – Design and installation

After the Tsunami: Sustainable Building Guidelines for Southeast Asia, 2007, United Nations Environment Programme and SKAT

Earthquakes

AS/NZS 1170.4 and .5: 2007 Structural Design Actions, Earthquake

NZS 4219: 2009 Specification for Seismic Resistance of Engineering Systems in Buildings

Guidelines For Earthquake Resistant Non-Engineered Construction, UNESCO, 2013, by Anand S. Arya, Teddy Boen, and Yuji Ishiyama

International Residential Code
- Section R602.10.3 Braced Wall Panels
- Section R602.10.5 Continuous Structural Panel Sheathing
- Section R602.10.6 Alternate Braced Wall Panels
- Section R703.7 Exceptions for Wood Structural Panel Sheathed Walls with Hold-Down Connections

Landslips

Landslides Hazards Handbook, ABCB (Australian Building Code Board), 2015

Bushfire

AS 3959: 2009 Construction of Buildings in Bushfire-Prone Areas

Building In Bush Fire Prone Areas, Government of Western Australia, Department of Commerce

Building Code of Australia, Section P2.3.5 Bushfire Shelters

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved for all BUILDINGS and FACILITIES
- Landscape / site engineering plan indicating all SITEWORK, plantings, erosion control, stormwater management, paving and other measures used to strengthen the DISASTER RESILIENCE of the project

Section J **NATURAL DISASTER RESILIENCE**

Section K

Major Infrastructure
Minor Structures

Contents

Table K1: Section K - Overview of Applicable Sections in the NBC

Section K

APPLICABLE SECTIONS OF THE NBC - OVERVIEW

		Building Group					Residential - Multiple Unit	Residential - Single Unit	Aged-Care, Health-Care	Commercial, Office, Industrial	Retail	Mixed Use	Schools	Major Infrastructure	Minor, Temporary Structures	Other Non-Residential
		1	2	3	4	5										
K1 Minor Structures																
K1.A	Outdoor Water Amenities															
K1.B	Retaining Walls										-					
K1.C	Outdoor Ovens and Fireplaces															
K2 Major Infrastructure																
K2.A	Bridge															
K2.B	Port, Wharf, Harbour, Jetty, Pier and Boardwalk															
K2.C	Seawalls and Shoreline Protection Structures															
K2.D	Outdoor Recreation Structures															
K2.E	Dams															

Refer to each section for specific requirements

To determine if a Section of the NBC applies to a particular DEVELOPMENT:

STEP 1. Use Table A2 Building Group Categories on page A4 to determine appropriate Building Group
STEP 2. Use Building Function definitions on page A2 and A3 to determine appropriate Building Function
STEP 3. Refer to Chart - if there is a dot on a Building Group number and a Building Function on the same row, that section in the NBC applies to the DEVELOPMENT

K ACCESSORY STRUCTURES

Section K OBJECTIVES

K(i)
The design, construction, alteration, operation, maintenance and demolition of **Minor Structures** and swimming pools must:

(a) safeguard people, property and the environment from the consequences of failure

(b) safeguard people and other property from illness or harm caused by the discharge of swimming pool waste water

(c) safeguard people from drowning or injury due to the use and operation of a swimming pool

(d) safeguard young children in outdoor play spaces

K(ii)
The design, construction, alteration, operation, maintenance and demolition of **Major Infrastructure** must:

(a) safeguard people, property and the environment, from harmful effects resulting from failure

(b) incorporate RESILIENT features to safely withstand unusual and unexpected events

K1 Minor Structures

REQUIRED PERFORMANCE

.1 **Minor Structures** are those associated with a SITE but not attached to the main BUILDING or FACILITY, and may be used for any building function but not for HABITABLE use, including:

(a) carport and detached PRIVATE GARAGES

(b) gazebo and shade structure

(c) farm BUILDING or greenhouse

(d) machinery or servicing equipment room

(e) private swimming pool

(f) external TOILET or SANITARY COMPARTMENT

(g) fence and/or retaining wall

(h) permanent, free-standing outdoor fireplace or oven

.2 **Minor Structures** must be constructed to the appropriate provisions in the NBC regarding: stability, access, HAZARDOUS SUBSTANCES, SITE SERVICING and waste, ENERGY EFFICIENCY and CLIMATE CHANGE ADAPTATION.

.3 Less stringent fire protection requirements as indicated in Section C Fire Protection are applicable for **Minor Structures** that do not contain a HAZARDOUS SUBSTANCE to the discretion of SFESA and the Government of Samoa.

.4 **Minor Structures** exempt from requiring a BUILDING PERMIT are:

(a) retaining walls up to 1.5 metres in height, providing they are not carrying any load other than the ground

(b) fences up to 2.0 metres in height (other than fences around swimming pools)

(c) garden sheds less than one STOREY and less than 10 m^2 in GROSS FLOOR AREA which do not have sanitary facilities, facilities for the storage of drinking water

(d) veranda or patio enclosure where the GROSS FLOOR AREA does not exceed five square metres

(e) low platforms (DECK) less than 1.5 metre off the ground

K1.A Outdoor Water Amenities

.1 Outdoor water amenities (swimming pools, irrigation, ponds) must be constructed to not:

(a) have offensive odour

(b) harbour contaminants or toxins in quantities that are harmful to people and the environment

(c) provide conditions for the growth of pathogens or other harmful substances

(d) entrap or injure people due to suction by a water recirculation system

.2 A minimum separation distance of 600 mm must be maintained from the EXTERNAL WALL of a swimming pool to the highest GROUNDWATER or perched WATER TABLE.

.3 Pool backwash water must be managed to ensure there are no health nuisances or localised FLOODING by:

(a) not discharging into an ON-SITE WASTEWATER MANAGEMENT system or STORMWATER MANAGEMENT SYSTEM

(b) being retained within the property boundaries

(c) discharging into a suitable disposal system (such as trenches, boreholes, infiltration pits, raised bed, mounds) located a minimum of 5 metres horizontal distance from any BUILDING or ON-SITE WASTEWATER MANAGEMENT system

(d) having a backwash pump with a hydraulic performance to ensure that the pool backwash water is properly dosed to the backwash disposal system

(e) be designed to adequately compensate for site specific limitations

.4 Filter outlets must have a washable 3 mm filter to prevent solids from entering the backwash disposal system.

.5 A swimming pool must have adequate means of draining the pool in a manner which will not:

(a) cause illness to people, or

(b) affect other property

.6 Heating for a swimming pool must be provided by any, some or all of the following:

(a) a solar heater not boosted by electric resistance heating

(b) a heater using reclaimed energy

(c) a gas heater

(d) a heat pump

.7 Swimming pool heaters must have a time switch to control the operation of the heater and circulation pump in order to save energy.

.8 Swimming pools and spas / hot tubs built into the side of a slope that retain more than 600 mm of soil must be constructed with the same construction techniques as a retaining wall (see Section K1.B Retaining Walls below, and must have structural stability in keeping with Section B).

.9 A swimming pool or spa/hot tub located on a roof top must be checked against seismic forces and constructed in accordance with Section B Stability and Section J1.C Earthquake Resilience.

.10 A swimming pool or spa/hot tub located near a descending slope must have a minimum SETBACK of 2.0m from the top of slope. If the slope exceeds 3:1 (horizontal to vertical), it must be setback in accordance with Section J1.E Landslip Resilience.

.11 In public places, where outdoor permanent water could present a danger of drowning and has a permanent water depth of 300 mm or more, the SITE must be protected by:

(a) adequate warning signs in Samoan and English informing people of the danger

(b) a continuous barrier such as fencing where the number of occupants, degree of supervision, BUILDING type and function warrants a controlled entry, with the following characteristics:
- (i) be continuous for the full extent of the HAZARD
- (ii) be of a strength and rigidity to withstand the foreseeable impact of people
- (iii) restrict the access of young children to the pool and the immediate pool surrounds
- (iv) have any gates and doors fitted with latching devices not readily operated by young children, and constructed to automatically close and latch
- (v) be a minimum of 1.2 m in height or greater if any of the conditions in Section D3.C Protection from Falling apply
- (vi) disallowing permanent objects near the barrier that could provide a climbing step

.12 Lighting for swimming pools, spas and hot tubs must comply with Section G4.M Electrical Equipment for Wet Areas and Swimming Pools in the NBC.

K1.B Retaining Walls

.1 Retaining Walls used to stabilise a slope and retain soil at a particular elevation (not SEAWALLS) must have adequate structural strength to withstand every day and extreme weather events, and comply with the following sections of the NBC:

(a) subsurface drainage (Section B2.1)

(b) backfilling and compaction (Section B2.1)

(c) Natural Disaster Resilience (Section J)

.2 Retaining walls must be designed to resist overturning, sliding, and excessive foundation-bearing pressure appropriate to:

(a) site conditions - topography, hydrology, geology, seismology, site usage

(b) soil characteristics

(c) loading conditions - water pressure, back slope angle of soil retained

.3 Retaining walls greater than 1.5 m in height located in any of the following areas must be designed by a PROFESSIONAL CONSULTANT (Structural Engineer) to the satisfaction of the Government of Samoa:

(a) within a COASTAL ZONE

(b) located less than 2.1 m from a descending slope with a minimum gradient of 3:1 (horizontal to vertical)

(c) within an area known for landslips

.4 Materials for retaining walls must:

(a) be structurally adequate to resist lateral forces and any applied loads reasonably expected

(b) prevent water build-up behind or below the wall by means of a sub-drain, weep holes, and/or other method acceptable to the Government of Samoa

(c) comply with the New Zealand Concrete Masonry Association standards as shown in Figure K1.B.4 below

Figure K1.B.4: NZCMA Minimum Standards for Concrete Retaining Walls

Concrete Retaining Wall Component	Minimum Standards according to NZCMA Concrete Masonry Manual	Applicable Standard
Reinforced Steel	• Grade 500 E	• AS/NZS 4671:2001, Steel Reinforcing Materials
Concrete Footings	• concrete having a minimum crushing strength of 25.0 MPa at 28 days • ready mixed concrete must have 20 mm maximum size aggregate, 25 MPa strength and with a 100 mm slump	• NZS 3109: 1997
Concrete Infill Grout	• minimum crushing strength of 20 MPa at 28 days and a spread between 450-530 mm	• NZS 4210 Masonry Construction: Materials and Workmanship • NZS 3112:1986 Specification for Methods of Test for Concrete
Mortar for Laying Blocks	• minimum compressive strength of 12.5 MPa	• NZS 4210 Masonry Construction: Materials and Workmanship = Appendix 2.A
Masonry Wall Construction	• minimum compressive strength of 12.5 MPa	• NZS 4210 Masonry Construction: Materials and Workmanship = Appendix 2.A

.5 Retaining walls are exempt from requiring a BUILDING PERMIT if any one of the following conditions apply:

(a) there is no surcharge loading over the zone other than loads applied from people or vehicles moving over it or the effects of rain

(b) total height of the retaining wall and of the fill or cut retained by the wall is 1 meter or less above the wall's natural ground surface

(c) the retaining wall is no closer than 1.5 meters to a BUILDING, FACILITY, **Major Infrastructure** or **Minor Structure** or another retaining wall

K1.C Outdoor Ovens and Fireplaces

.1 **Minor Structures** used for heating or containing an appliance used for heating must comply with Section C1.D Open Fireplaces and Ovens, and Section C1.E Chimneys and Flues.

ACCEPTABLE SOLUTIONS

AS 1288: 2006 Glass in Buildings - Selection and Installation - Glass Pool Fence
AS 1926: 1986 Swimming Pool Safety
Part 1 2012 Safety Barriers for Swimming Pools
Part 2 2007 Location of Safety Barriers for Swimming Pools
Part 3 2010 Water Recirculation Systems Amdt 1
AS 1725: 2003 Chain Link Fabric Fencing Series
AS 2818: 1993 Guide to Swimming Pool Safety
AS 2820: 1993 Gate Units for Private Swimming Pools

AS/NZS 2312: 2012 Guide to the Protection of Structural Steel Against Atmospheric Corrosion by the Use of Protective Coatings
AS/NZS 3014: 2003 Electrical Installations - Electric Fences
AS/NZS 4586: 2004 Slip Resistance Classification of New Pedestrian Surface Materials - pool surround
AS/NZS 4671: 2001 Steel Reinforcing Materials

New Zealand Concrete Masonry Manual, Section 6.1 Masonry Retaining Walls, February, 2012

New Zealand Fencing of Swimming Pools Act 1987

NZS 1170.5: 2004 Structural Design Actions, Part 5: Earthquakes
NZS 3109: 1997 Concrete Construction
NZS 4203: 1992 General Structural Design And Design Loadings for Buildings
NZS 4229: 2013 Concrete and Masonry Buildings not Requiring Specific Engineering Design, Appendix C
NZS 4230: 1990 Code of Practice for the Design of Masonry Structures

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS

K2 Major Infrastructure

REQUIRED PERFORMANCE

.1 **Major Infrastructure** projects are structures serving the public including, but not limited to, the following:

(a) bridge

(b) marine structures - port, wharf, harbour, jetty, and pier, see Figure K2.B.1

(c) boardwalk, see Figure K2.B.1

(d) SEAWALL (including a BUILDING sited adjacent to a waterbody that acts as a seawall), see Figure K2.C.3

(e) recreational activities such as a zipline, skyrail, amusement rides

(f) dam and river protection

(g) major slope retention

(h) underground tanks

.2 **Major Infrastructure** projects must comply with the following provisions in the NBC to ensure stability, safety and environmental protection:

(a) Section B Stability

(b) Section C Fire Protection

(c) Section D Access

(d) Section E Hazardous Substances

(e) Section G Site Servicing and Waste

(f) Section H Climate Change Adaptation

(g) Section J Natural Disaster Resilience

.3 Design and construction must be appropriate to the following site characteristics:

(a) geological structure

(b) hydrological resources

(c) soil profile

(d) potential for DISASTERS - cyclones, tsunamis, earthquakes, landslips, and bushfire

(e) ecology and natural features

.4 Safety features that must be incorporated into **Major Infrastructure** projects include:

(a) appropriate size and placement of fencing, barriers, and/or HANDRAIL where the change in grade

exceeds 1.0 m - see Section D3.C Protection from Falling

(b) provision of even, non-slip surfaces in publicly accessible areas

(c) appropriate lighting for user safety and security

(d) avoidance of details that would entrap a person inside or under a structure

(e) warning signs that are easily visible and located appropriately

(f) safety equipment for first aid and rescue

(g) provision of security measures to restrict access to non-public or dangerous areas

.5 An Operations and Maintenance Manual that includes a monitoring program and inspection schedule must be provided as part of the BUILDING PERMIT application.

.6 Protection of a **Major Infrastructure** project sited in close proximity to a shoreline, cliff or area prone to landslips must comply with the approved government prescribed plans for shoreline protection and coastal management for the location. Priority must be given, to the degree possible, to any, some or all of the following natural shoreline protection methods:

(a) dune and cliff stabilisation (dewatering)

(b) beach replenishment

(c) protection and installation of mangroves and/or other natural shoreline vegetative solutions

(d) planting vegetation along area subject to erosion

(e) re-location of **Major Infrastructure** away from area vulnerable areas

.7 Design, construction, operation, alteration and demolition of **Major Infrastructure** must be administered according to the Government of Samoa Code of Environmental Practice and any other policies, guidelines or legislation of the Government of Samoa.

DEEMED-TO-SATISFY PROVISIONS

K2.A Bridge

.1 Bridges intended primarily for vehicular use must be constructed of reinforced concrete or galvanised steel, unless the size, scale and use justifies the use of an alternate material.

.2 Pedestrian bridges may be constructed of DURABLE and weather-resistant timber, hot-dip galvanised steel, concrete, stone or a combination thereof. Minor pedestrian structures of a temporary nature (design life up to 20 years) may utilise seasoned hardwood treated with preservative or other suitable material.

.3 Design and construction of a bridge must be appropriate to:

(a) DEAD LOAD

(b) LIVE LOAD including pedestrians, livestock, bicycles and vehicles (cars, trucks, trains, motorcycles)

(c) collision loads

(d) kerb and barrier design loads

(e) earth pressure and seismic forces

(f) forces from water flow

(g) wind loads

(h) thermal effects

(i) shrinkage, creep and pre-stress effects, and friction

.4 Design of the bridge and grading at stream crossings must ensure the following:

(a) sufficient clearance is provided above expected FLOOD levels

(b) fill of excavated area is of sufficient strength to withstand river flows and FLOODING

(c) BUILDING MATERIAL and by-products of construction do not contaminate or affect sensitive habitats

.5 Kerbs on both sides of the bridge, where used, must be even in height unless site conditions warrant an alternative.

.6 Design of railing, cables and all other features must ensure that clear horizontal and vertical sight lines are provided.

.7 The design of safety barriers, their layout, extent and their interface with rigid barriers must be in accordance with AS / NS 3845 – Road Safety Barrier System and the Australian Bridge Design Code (SAA HB77).

.8 Abutments and piers must be smooth textured and protected with a sealant appropriate for the easy removal of graffiti.

.9 Bridge design must incorporate CONDUIT for piped utilities (water supply, sewage) and electrical CONDUCTORS crossing the span whether it will be installed at the time of the bridge construction or at a later date.

K2.B Port, Wharf, Harbour, Jetty, Pier and Boardwalk

.1 Site selection for a port, wharf, harbour, jetty pier or boardwalk (see description in Figure K2.B.1) must be appropriate to:

(a) tidal and wave action

(b) shoreline natural and synthetic features

(c) DISASTER potential - cyclones, tsunamis, earthquakes, landslips, bushfire

(d) anticipated capacity for storage and handling of cargo, passengers and pedestrians

(e) type of ships and mooring depth

(f) potential danger to adjacent properties due to operation and handling of HAZARDOUS SUBSTANCES

Figure K2.B.1: Marine Structures

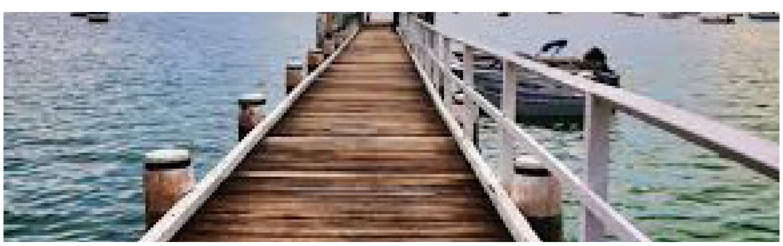
Port - a place on the coast for loading and unloading of commercial ships and cruise ships, often with warehouses and other buildings to support commercial shipping and tourism

Wharf - a structure built into the shoreline or projecting out into the water where ships can be moored, loaded and unloaded

Harbour - a natural place used for safe anchorage of ships, used for ships to moor safely during bad weather

Jetty / **Groyne** - a built-up bank to influence the or tide or to protect a harbour or shoreline from storms, tides or erosion

Pier / Boardwalk a raised wooden structure built adjacent to the shoreline or projecting outward into the water typically supported by widely spread piles or pillars allowing tides and currents to flow almost unhindered



Dock - place for harbouring boats, mostly recreational

.2 User safety on ports, wharfs, jetties, boardwalks must be provided by:

(a) restricted access where there is the potential for harm

(b) guidance to access points

(c) kerbs or wheel stops to offer protection for wheelchair users, where necessary

(d) timber HANDRAIL, where used, that are free of splinters and preservative oils

(e) signage and identification of safe passageways

.3 Any prefabricated, system-designed or custom-designed structures, features and equipment for a port, wharf, jetty or boardwalk must be accompanied by PRODUCT INFORMATION SHEETS describing stability, DURABILITY, environmental impact and fire protection that are acceptable to the Government of Samoa.

.4 Standard minimum width of a commercial WHARF based on ship type must be:

(a) for two-sided unloading - 27 m

(b) for container ships - 24 m

(c) for deep-draft non-containerised ships using one-sided unloading - 18 m

(d) for lighterages - 10.5 m or 12.8 m

(e) or any other minimum width required by the Samoa Ports Authority of the Government of Samoa

.5 Height in relation to sea level of a port, wharf, jetty and/or boardwalk must:

(a) have a minimum depth below the mean low water appropriate to the type of ships using the port, wharf, jetty or boardwalk

(b) have adequate clearance above the highest astronomical tides with markers installed to indicate the extent of the works when inundated by extreme weather events

(c) be adequate to accommodate the expected rise in sea level resulting from CLIMATE CHANGE for a minimum 50-year period

.6 Length, elevation, and spacing between JETTIES must be based on local wave energy and on beach slope.

.7 Impact protection from ships must be integrated with the design of the port, wharf, jetty and/or boardwalk.

.8 Mooring structures / equipment must be designed to hold the ship in position once the ship has docked so that loading/offloading can take place safely.

.9 Depth of the approach channels, the berthing location, exit channels, and underwater structure of the jetty must be appropriate for the function and use of the port, wharf, jetty and/or boardwalk.

K2.C Seawalls and Shoreline Protection Structures

.1 All SEAWALLS and shoreline protection (breakwalls, perched beaches, jetties/groynes) must be designed by a PROFESSIONAL CONSULTANT as recognised by the Association of Professional Engineers in Samoa or a similar professional organisation overseas.

.2 SEAWALLS and shoreline protection must sustain required loads and resistance to earthquakes and wind in accordance with AS/NZS 1170, and have subsurface drainage that complies with Section B2 Siteworks of the NBC.

.3 SEAWALLS may consist of the following types, as illustrated in Figure K2.C.3, if they are constructed to be stable throughout their LIFESPAN and comply with all provisions in the NBC:

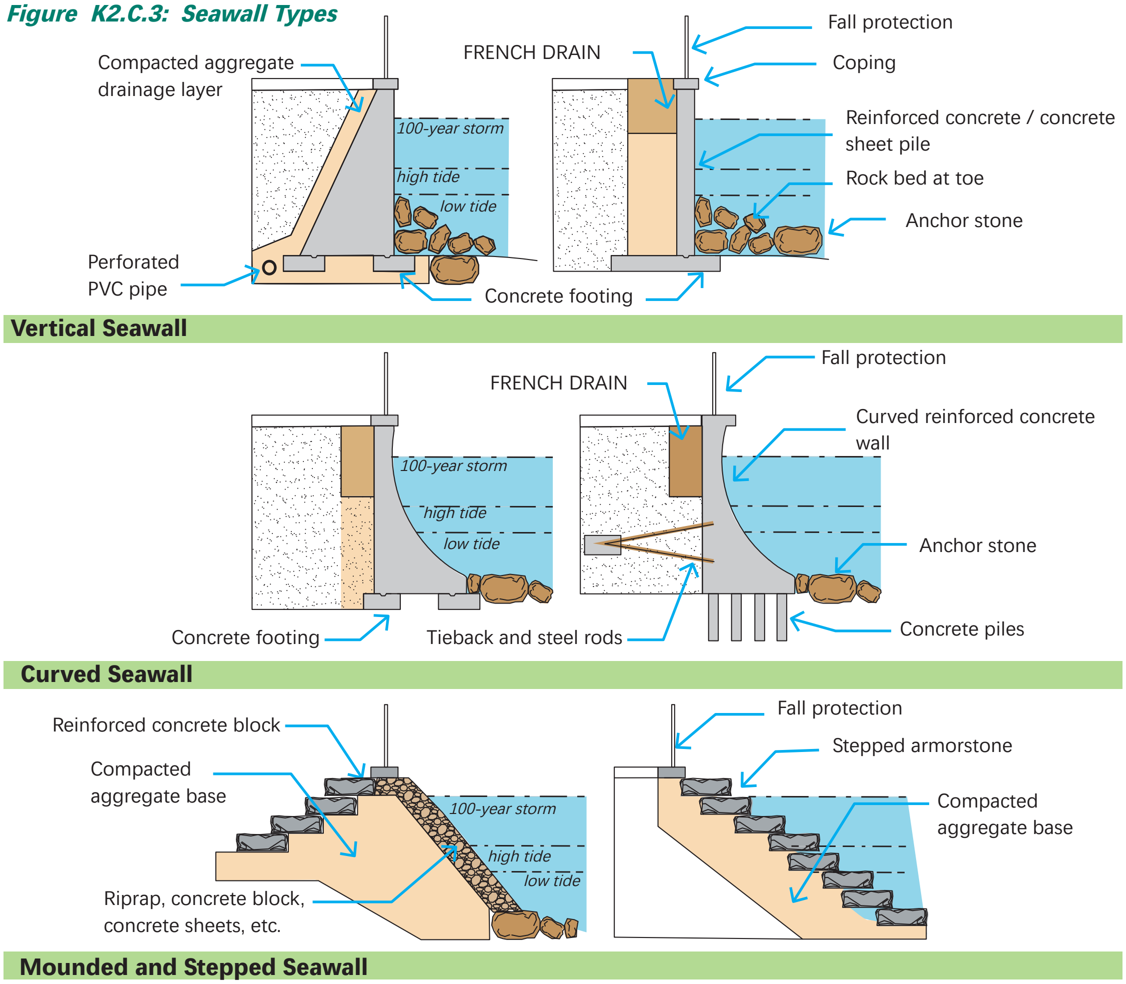
(a) vertical SEAWALLS with riprap / revetment at the toe on the seaward side

(b) curved or stepped SEAWALLS

(c) mounded SEAWALLS using revetment, sandbags, stone, construction waste, or other hard, synthetic material

(d) a combination of the above SEAWALL types and features

Figure K2.C.3: Seawall Types



.4 SEAWALL height, width and construction method must be designed so that over its LIFESPAN it:

(a) protects the shoreline with regard to tides, wave action, STORM SURGE, extreme weather events, and the rising sea level associated with all of these factors

(b) can be easily increased in size to accommodate the expected 100-year rise in sea level

(c) minimises the potential for land erosion and beach depletion on site and on adjacent properties

(d) does not impose loads on nearby existing structures or SITEWORK that would exceed the design capabilities of the existing structures or SITEWORK

(e) has adequate clearance above the highest astronomical tides with markers installed to indicate the extent of the works when inundated by extreme weather events

(f) adequately accommodates the expected rise in sea level resulting from CLIMATE CHANGE and be structurally sound for a 50 year period at a minimum

.5 Acceptable materials for SEAWALLS include the following:

(a) precast reinforced concrete sheet pile units

(b) pre-stressed concrete sheet pile units

(c) aluminium sheet piles

(d) vinyl PVC (polyvinyl chloride) sheet piles

(e) fibre reinforced / carbon enhanced resin composite sheet piles

(f) steel sheet piles with protective marine coating

(g) other materials where supported by detailed engineering studies that demonstrate suitability, structural STABILITY, and acceptable environmental impacts

.6 Design and construction of SEAWALLS and shoreline protection must achieve the following performance standards:

(a) appropriate placement with respect to site features and natural processes

(b) relief of hydrostatic pressure by the use of one, some or all of the following:
- (i) weep holes protected by filter fabric
- (ii) FRENCH DRAINS consisting of gravel wrapped with filter fabric
- (iii) other subsurface drainage techniques

(c) secured through anchor reinforcement and/or tie-back placement

(d) appropriate length relative to adjacent property

(e) does not violate existing water quality standards, impede navigation or exacerbate FLOODING

.7 Restoration of an existing SEAWALL or shoreline protection must only be done if the existing structure is functional with no cracks or breaks allowing water to flow through, and must:

(a) be constructed:
- (i) at its previous location, or
- (ii) inland from its previous location, or
- (iii) within 300 mm waterward of its previous location

(b) not include additional fill beyond that necessary for the restoration of the SEAWALL

(c) have existing rocks stockpiled and inspected by the Government of Samoa to confirm suitability for incorporation into the new SEAWALL.

.8 The use of explosives for excavation or other purposes is not permitted for the construction of SEAWALLS or other shoreline protection.

.9 Clean, granular fill behind the SEAWALL must consist of a suitable soil composition and structure that is:

(a) permeable

(b) structurally stable

(c) sufficiently compacted to prevent slumpage

(d) free from pollutants, HAZARDOUS SUBSTANCES, or other toxic material

(e) minimum width of 1.5m, and increased in size based on site characteristics, SEAWALL size, soil conditions

.10 Tie-back SEAWALL design must:

(a) use minimum grade 60 reinforcing rods or hot dipped galvanised rods wrapped with polyethylene

(b) use concrete anchors with a minimum 28-day compressive strength of 3,000 psi

.11 SEAWALLS with a cantilever do not need a tieback system, but must have an expansion joint where the cantilever abuts an existing supporting structure.

K2.D Outdoor Recreation Structures

.1 The following outdoor recreation activities that receive Development Consent are required to receive a BUILDING PERMIT:

(a) treehouses or other elevated structures for commercial use

(b) elevated boardwalks, swinging bridges, viewing or resting platforms greater than 1.5m from the ground

(c) structural support for ziplines, bungee jumping and other similar activities

(d) activities associated with an amusement park, water park or non-residential swimming pool

(e) any other outdoor recreation activity deemed necessary to receive a BUILDING PERMIT by the Government of Samoa

.2 All outdoor recreation activities listed above in Section K2.D.1 must comply with the relevant sections of the NBC, including:

(a) Section B Stability - ensuring all support members provide stability and endurance

(b) Section C Fire Protection - all materials must be FIRE-RESISTANT

(c) Section D Access - required number of EMERGENCY EXITS, access for PERSONS WITH A DISABILITY

(d) Section E Hazardous Substances - safe use, storage and disposal, where applicable

(e) Section F Interior - adequate lighting

(f) Section G Site Servicing and Waste - water supply, SANITARY COMPARTMENTS, power (electrical, fuel), waste disposal

(g) Section H Climate Change Adaptation - RENEWABLE ENERGY, GREEN ROOFS, GHG emissions reductions

(h) Section J Natural Disaster Resilience

K2.E Dams

.1 No person may abandon a dam located in or adjacent to a body of water, remove a dam, or begin the construction, enlargement, modification, or repair of a dam without receiving a BUILDING PERMIT, except where repair is needed immediately to safeguard life and property.

.2 Design and construction of a dam must demonstrate the following performance standards:

(a) slope stability under all probable loading conditions

(b) stability against sliding and overturning

(c) adequacy of foundation for imposed loads

(d) adequacy of energy dissipating devices at DISCHARGE AREAS

(e) adequacy of channels and CONDUIT for expected flows

(f) protection of embankments and other earth slopes from erosion

(g) stability against seismic forces

(h) safe ACCESS to and from the dam, and reliable escape routes for downstream residents in the event of failure

.3 During construction, adequate measures must be taken to prevent excessive erosion and off-site sedimentation in accordance with Section B2 Site Works, including any, some, or all of the following:

(a) provision of temporary vegetation, mulching

(b) staked straw bales

(c) sediment control / filter fabric

(d) fences

(e) temporary retaining structures such as rip rap, armorstone, and the like

.4 Spillways must be free of woody vegetation with an adequate SETBACK and/or barrier constructed to prevent unwanted migration of plant material.

.5 No grass, vines, brush, trees or other vegetation is permitted to grow in cracks or joint of concrete or masonry structures.

.6 All dams must be sized to accommodate the Spillway Design Flood (SDF) or Inflow Design Flood (IDF) of the 100-year storm based on the following HAZARD classifications:

(a) Class 1 - a dam whose failure would result in probable loss of life, serious HAZARD to public health, or serious damage to homes, high-value **Industrial** or **Commercial** properties, or major public utilities

(b) Class 2 - a dam whose failure would result in a possible health HAZARD, probable loss of high-value property, probable damage to major highways, railroads, or other public utilities, or probable damage to or loss of significant habitat, but not result in loss of human life

(c) Class 3 - dam whose failure would result in property losses restricted mainly to rural land, BUILDINGS, and local roads, and would not result in loss of human life or HAZARD to health

or an ALTERNATIVE SOLUTION acceptable to the Government of Samoa

.7 Hydrological analysis for estimating the Spillway Design Flood (SDF) or Inflow Design Flood (IDF) must include, but not be limited to, consideration of:

(a) delineation of the watershed contributing to the dam

(b) modelling precipitation amounts and distribution over the storm duration

(c) estimating infiltration to compute RUNOFF volume

(d) computing RUNOFF distribution based upon a synthetic hydrograph theory

(e) storage routing of the inflow through the impounding body (lake, reservoir, etc.)

(f) FLOOD protection required for the dam

.8 All recommendations in the Environmental Impact Assessment prepared as part of the Development Consent approval process must be reflected in the design and construction of the dam.

.9 A geotechnical investigation is required for Class 1 and Class 2 dams (dams whose failure would result in a possible or certain health HAZARD, loss of high-value property, damage to major highways, railroads, or other public utilities, or damage to or loss of significant habitat and/or human life), and must include the following:

(a) stability analysis based on soil, hydrological and geological conditions of the site and any adjacent lands that have an environmental impact on the site

(b) seepage analysis, including consideration of internal erosion potential

(c) settlement and deformation analysis

(d) foundation evaluation

(e) analysis of embankment materials

(f) quality control and assurance during construction

.10 Earthquake analysis appropriate to the type and classification of the dam must include:

(a) an estimation of seismic HAZARDS - ground shaking, fault rupture, seiche waves, where applicable

(b) analysis of expected performance during possible earthquake shaking

(c) design and construction for safe performance during earthquakes

.11 Tailings dams built to impound mining waste must, in addition to the other provisions in Section K5:

(a) have an analysis of the liquefaction potential of the slurry with an acceptable environmental

performance

(b) dam break analyses and an analysis of environmental impacts

(c) slurry flow modelling (for slurry filled impoundment)

(d) closure/abandonment procedures and plans

ACCEPTABLE SOLUTIONS

Bridges

AS 3703.1: 1989 Long-Span Corrugated Steel Structures - Material and Manufacture
AS 4100: 1998 Steel Structures
AS 5100.2: 2004 Bridge Design: Design Loads

AS/NZS 3845: 1999 Road Safety Barrier System and the Australian Bridge Design Code (SAA HB77)

Australian Bridge Design Code (SAAHB77)

Design Standards for Urban Infrastructure, 7 – Bridges & Related Structures, Urban Services

New Zealand Transport Agency's Bridge Manual New Zealand Transport Agency's Bridge Manual (3rd edition)

Port, Wharf, Jetty and Boardwalk

AS 2272: 2006 Plywood - Marine
AS 4997: 2005 Guidelines for the Design of Maritime Structures

BS6349: Part 4 : 1994 gives guidance on types of fenders, fendering systems and layouts, mooring devices and ropes, mooring system layouts

NFPA 307: 2016 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves

Dam

New Zealand Dam Safety Guidelines, 2015

SUBMISSION

- Construction drawings indicating how all performance objectives have been achieved along with a list of ACCEPTABLE SOLUTIONS
- A dam safety management plan describing the consequences of dam failure and incorporating policies, procedures and responsibilities, must be in prepared as part of the BUILDING PERMIT process
- An Environmental Impact Assessment, where determined necessary by the Government of Samoa, must be submitted as part of the BUILDING PERMIT Application.

List of Acceptable Solutions used in the NBC

Contents

Part 1: STANDARDS DERIVED FROM A BUILDING CODE

Australian Building Code Standards

AS 1012 Methods of Testing Concrete Series
AS 1050: 2015 Methods for the Analysis of Iron and Steel Series
AS 1056.1-1991, Storage Water Heaters – General Requirements
AS 1231: 2000 Aluminium and Aluminium Alloys - Anodic Oxidation Coatings
AS 1273: 1991 Unplasticised PVC (uPVC) Down Pipe and Fittings for Rainwater
AS 1288: 2006 Glass in Buildings - Selection and Installation - Glass Balustrades / Glass Pool Fence
AS 1289: 2000 Methods of Testing Soils for Engineering Purposes
AS 1308: 1987 Electric Water Heaters - Thermostats and Thermal Cut-Outs
AS 1316: 2003 Masonry Cement
AS 1357: 2009 Water Valves for Use with Unvented Water Heaters
AS 1366: 1992 Rigid Cellular Plastics Sheets for Thermal Insulation, Part 1 : 2010 Materials, Design, Performance
AS 1379: 2007 Specification and Supply of Concrete Series
AS 1391: 2007 Metallic Materials - Tensile Testing at Ambient Temperature
AS 1397: 2001 Steel Sheet and Strip - Hot Dipped Zinc-Coated or Aluminium / Zinc-Coated
AS 1397: 2011 Continuous Hot-Dip Metallic Coated Steel Sheet and Strip (Wall and Roof Cladding)
AS 1684: 2010 Residential Timber-Framed Construction - Part 3 Cyclonic Areas
AS 1432: 2004 Copper Tubes for Plumbing, Gas Fitting and Drainage Applications
AS 1442: 2007 Carbon Steels and Carbon-Manganese Steels - Hot-Rolled Bars and Semi-Finished Products
AS 1444: 2007 Wrought Allow Steels - Standard, Hardenability (H) Series
AS 1445: 2013 Hot-Dipped Zinc-Coated. Aluminium/Zinc-Coated or Aluminium/Zinc/Magnesium-Coated Steel Sheet - 76 mm pitch corrugated
AS 1448: 2007 Carbon Steel and Carbon-Manganese Steels - Forgings
AS 1478: 1992 Chemical Admixtures for Concrete Mortar and Grout Series
AS 1530: 1994 Methods For Fire Tests on Building Materials, Components and Structures
  Part 1: Combustibility Test For Materials
  Part 2: Text for Flammability of Materials
  Part 3: Simultaneous Determinations of Ignitability, Flame Propagation, Heat Release and Smoke Release
  Part 4: Fire-Resistance Texts on Elements of Construction
Part 4: Fire-resistance Texts on Elements of Construction
AS 1530.7: 2007 Methods for Fire Tests on Building Materials, Components and Structures, Part 7: Smoke Control Assemblies
AS 1548: 2008 Fine Grained, Weldable Steel Plates for Pressure Equipment
AS 1562: 1992 Design and Installation of Sheet Roof and Wall Cladding - Metal
AS 1579: 2001 Arc Welded Steel Pipes and Fittings for Water and Wastewater
AS 1589: 2001 Copper and Copper Alloy Waste Fittings
AS 1604: 1997 Specification for Preservative Treatment Series - Timber
AS 1646: 2007 Elastomeric Seals for Waterworks Purposes
AS 1657: 2013 Fixed Platforms, Walkways, Stairways and Ladders - Design, Construction and Installation
AS 1668.2: 2012 The Use of Air Conditioning and Ventilation in Buildings
AS 1670: 1986 Fire Detectors in Exhaust Ducts
AS 1684: 2010 Residential Timber-Framed Construction - Tongued, Grooved, Plywood and Particleboard Flooring
AS 1684.1: 1999 Residential Timber-Framed Construction - Design Criteria
AS 1684.2: 2010 Residential Timber-Framed Construction - Non-Cyclonic Areas
AS 1684.4: 2010 Residential Timber-Framed Construction - Simplified - Non-Cyclonic Areas
AS 1691: 1985 Domestic Oil-Fired Appliances - Installation
AS 1720: 1990 Timber Structures, Part 4 Fire Resistance of Structural Timber
AS 1720.1 2010 Timber Structures - Design Methods
AS 1725: 2003 Chain Link Fabric Fencing Series
AS 1735.11: 1986 Fire-Rated Landing Doors
AS 1735.2: 2001 Passenger and Goods Lifts – Electric
AS 1735.12 to 1735.17: 1995 Lifts, Escalators and Moving Walks – Facilities for Persons with Disabilities
AS 1735.3: 2002 Passenger and Good Lifts - Electro Hydraulic
AS 1735.4: 1986 Service Lifts - Power Operated.
AS 1735.5: 2015 Escalators and Moving Walks
AS1735.7: 1998 Stairway Lift:
AS 1735.8: 1986 Inclined Lifts
AS 1735.9: 1994 Special Purpose Industrial Lifts
AS 1735.10: 1998 Tests

AS 1741:1991 Vitrified Clay Pipes and Fittings with Flexible Joints
AS 1789: 2003 Electroplated Zinc (Electrogalvanized) Coatings on Ferrous Articles (Batch Process)
AS 1815: 1991 Metallic Materials - Rockwell Hardness Test Series
AS 1816: 1990 Metallic Materials - Brinell Hardness Test Series
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AS 1830: 2007 Grey Cast Iron
AS 1831: 2007 Ductile Cast Iron
AS 1832: 2007 Malleable Cast Iron
AS 1851: 2012 Routine Service of Fire Protection Systems and Equipment
AS 1860.1: 2002 Particleboard Flooring - Specifications
AS 1874: 2000 Aluminium and Aluminium Alloys - Ingots and Castings
AS 1884: 2012 Floor Coverings - Resilient Sheet and Tiles - Laying and Maintenance Practices
AS 1905: 1976 Components for the Protection of Openings in Fire-Resistant Walls
Part 1: Fire-Resistant Doorsets
Part 2: Fire-Resistant Roller Shutters
AS 1905.1: 2005 Components for the Protection of Openings in Fire-Resistant Walls
AS 1909: 1984 Installation of Timber Doorsets
AS 1926: 1986 Swimming Pool Safety
Part 1: 2012 Safety Barriers for Swimming Pools
Part 2: 2007 Location of Safety Barriers for Swimming Pools
Part 3: 2010 Water Recirculation Systems Amdt 1
AS 1940: 2004 Storage and Handling of Flammable and Combustible Liquids

AS 2027: 2007 Abrasive-Resistant Cast Irons
AS 2047: 2014 Windows and External Glazed Doors in Buildings - Selection and Installation
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AS 2050: 2002 Installation of Roof Tiles
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AS 2118.1 1999 Automatic Fire Sprinkling Systems
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Part 4: Sound Systems and Intercom Systems for Emergency Purposes
AS 2159: 1995 Rules for the Design and Installation of Piling (Known as the SAA Piling Code)
AS 2208: 2006 Safety Glazing Materials in Buildings
AS 2272: 2006 Plywood - Marine
AS 2293: 2005 Emergency Escape Lighting and Exit Signs for Buildings
AS 2327: 2003 Composite Structures - Part 1 Simply Supported Beams
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AS 2345: 2006 Dezincification Resistance of Copper Alloys
AS 2350: (Frc) Methods of Testing Portland and Blended Cements Series
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AS 2369.2: 1993, Materials for Solar Collectors for Swimming Pool Heating – Flexible or Plasticized Polyvinyl Chloride
AS 2404: 1980 Textile Floor Coverings - Fire Propagation of the Use-Surface Using a Small Ignition Source
AS 2441: 2005 Installation of Fire Hose Reels
AS 2444: 2001 Portable Fire Extinguishers and Fire Blankets - Selection and Location
AS 2454: 2007 Textile Floor Coverings - Terminology
AS 2560.2.5: 2007 Sports Lighting – Specific Applications – Swimming Pools
AS 2560.1: 2002 Sport Lighting – General Principles
AS 2665: 2001 Smoke / Heat Venting Systems - Design, Installation and Commissioning
AS 2688: 1984 Timber Doors
AS 2689: 1984 Timber Doorsets
AS 2701: 2001 Methods of Sampling and Testing Mortar for Masonry Constructions
AS 2796.2: 2006 Timber -Hardwood - Sawn and Milled Products - Grade Description
AS 2818: 1993 Guide to Swimming Pool Safety
AS 2820: 1993 Gate Units for Private Swimming Pools
AS 2845: 2010 Water Supply - Mechanical Backflow Prevention Devices

AS 2858: 2008 Timber - Softwood - Visually Stress-Graded for Structural Purposes AS 2870: 2011 Residential Slabs and Footings - Construction
AS 2887: 1993 Plastic Waste Fittings
AS 2941: 2013 Fixed Fire Protection Installation

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AS 3571: 2009 Plastic Piping Systems – Glass Reinforced Thermoplastics (GRP) Systems Based on Unsaturated Polyester (UP) Resin – Pressure and Non-Pressure Drainage and Sewerage (ISO 10467: 2004 MOD)
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AS 3588: 1996 Shower Bases and Shower Modules
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AS 3610: 1995 Formwork for Concrete Series
AS 3634: 989 (R2013) Solar Heating Systems for Swimming Pools
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AS 3690: 2009 Installation of ABS Pipe Systems
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AS 3703.1: 1989 Long-Span Corrugated Steel Structures - Material and Manufacture
AS 3735: 2001 Concrete Structure Retaining Liquids
AS 3740: 2010 Waterproofing of Domestic Wet Areas
AS 3745: 2010 Planning for Emergencies in Facilities
AS 3786: 2014 Smoke Alarms Using Scattered Light, Transmitted Light or Ionisation
AS 3818: 2009 Timber - Heavy Structural Products - Visually Graded Series
AS 3850: 2003 Tilt-Up Concrete Construction
AS 3958.1:2007 Ceramic Tiles - Guide to the Installation of Ceramic Tiles
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AS 4290: 2000 Design and Installation of Revolving Doors
AS 4343: 2014 Pressure Equipment Hazard Levels
AS 4420: 2014 Windows - Methods of Test Series
AS 4426-1997, Thermal Insulation of Pipework, Ductwork and Equipment – Selection, Installation and Finish
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AS 4509: 2009 Stand-Alone Power Systems Part 1: Safety Requirements Part 2: Design Guidelines
AS 4552: 2005 Gas-Fired Water Heaters for Hot Water Supply and/or Central Heating
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AS 4654.2: 2012 Waterproofing Membranes for External Above-Ground Use - Design and Installation
AS 4662: 2003 Ceramic Tiles - Definitions Classification, Characteristics and Marking
AS 4674: 2004 Design, Construction and Fit-out of Food Premises
AS 4678: 2003 Earth-Retaining Structures
AS 4696: 2007 Hygienic Production and Transportation of Meat and Meat Products for Human Construction
AS 4755.3.1-2008 Demand Response Capabilities and Supporting Technologies for Electrical Products – Interaction
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AS 4777: 2005 Grid Connection of Energy Systems Via Inverters Series
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AS 4785.2: 2002 Timber - Softwood - Sawn and Milled Products - Grade Description
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AS 5040: 2003 Installation of Security Screen Doors and Window Grilles
AS 5049: 2007 Cast Iron - Designation of Microstructure of Graphite
AS 5052: 2007 Compacted (Vermicular) Graphite Cast Irons - Classification
AS 5100.2 2004 Bridge Design: Design Loads
AS 5102.1: 2009 Performance of Household Electrical Appliances – Swimming Pool Pump-Units – Energy Consumption and Performance
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AS 6905: 2007 Smoke Doors

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HB 326: 2008 Urban Greywater Installation Handbook for Single Households
HB 276: 2004 A Guide to Good Practice for Energy Efficient Installation of Residential Heating, Cooling & Air Conditioning Plant & Equipment

Specifications Within The Building Code Of Australia, Volume 1

Specification A2.3 Fire Resistance Of Building Elements
Specification A2.4 Determining Fire Hazard Properties, Group Number and Smoke Growth Rate Index
Specification C1.1 Fire-Resisting Construction
Specification C1.10 Fire Hazard Properties
Specification C1.11 Performance of External Walls in Fire
Specification C1.8 Lightweight Construction
Specification C2.5 Smoke-Proof Walls in Health-Care and Aged-Care Buildings
Specification C3.15 Penetration of Walls, Floors and Ceilings by Services
Specification C3.4 Fire Doors, Smoke Doors, Fire Windows And Shutters
Specification C38 Fire and Smoke Control Systems in Containing Atria
Specification D1.12 Non-Required Stairways, Ramps and Escalators
Specification E1.5 Fire Sprinkler Systems
Specification E1.8 Fire Control Centres
Specification E2.2a Smoke Detection and Alarm System
Specification E2.2b Smoke Exhaust Systems
Specification E3.1 Lift Installations
Specification E4.8 Photo-Luminescent Exit Signs
Specification H1.3 Construction of Theatres with Proscenium Walls
Specification JV Annual Energy Consumption
Specification J1.3 Roof and Ceiling Construction
Specification J1.5 Wall Construction
Specification J1.6 Floor Construction
Specification J5.2a Fans
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Specification J5.2c Piping, Vessel, Heat Exchanger and Tank Insulation
Specification J5.2d Space Heating
Specification J5.2e Energy Efficiency Ratios

Australia Building Code and International Standard Organisation Standards

AS ISO 14064.2: 2006, Greenhouse Gases – Specification With Guidance at the Project Level For Quantification and Reporting of Greenhouse Gas Emission Reductions and Removal Enhancements (ISO 14062-2:2006, Mod)
AS ISO 14064.3: 2006, Greenhouse Gases – Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions
AS ISO 14065: 2009 Greenhouse Gases - Requirements for Greenhouse Gas Validation and Verification Bodies for Use in Accreditation or Other Forms of Recognition
AS ISO 9239.1: 2003 Reaction to Fire Tests for Floor Coverings
AS ISO 9705: 2003 Fire Tests - Full Scale Room Test for Surface Products

Australia and New Zealand Building Code Standards

AS/NZS 1080: 2012 Timber - Methods of Test Series
AS/NZS 1158.6: 2006 Lighting for Roads and Public Spaces
AS/NZS 1163: 2009 Cold-Formed Structural Steel Hollow Sections
AS/NZS 1170: 2002 Structural Design Actions Part 2 Wind Actions
AS/NZS 1170.2: 2011 Structural Design Actions - Wind Actions - Wind Loads for Windows
AS/NZS 1200: 2015 Boilers and Pressure Equipment
AS/NZS 1254: 2010 PVC Pipes and Fittings for Stormwater and Surface Water Applications
AS/NZS 1260: 2002 and 2009 PVC Pipes and Fittings for Drain, Waste and Vent Applications
AS/NZS 1276.1: 1999 Acoustics - Rating of Sound Insulation in Buildings and Building Elements - Airbourne
AS/NZS 1385: 2007 Textile Floor Coverings - Metric Units and Commercial Tolerances for Measurement
AS/NZS 1477: 2006 PVC Pipes and Fittings for Pressure Applications
AS/NZS 1530.2: 1993 Method for Fire Tests on Building Materials
AS/NZS 1530.3: 1999 Methods for Fire Tests on Buildings
AS/NZS 1546.1:2008 On-Site Domestic Wastewater Management Units
Part 1: Septic tanks, applies in all other aspects for septic tanks, greywater tanks, holding tanks and pump wells
Part 2: Waterless Composting Toilets
Part 3: Aerated Wastewater Management Systems
AS/NZS 1547: 2012 On-Site Domestic Wastewater Management
AS/NZS 1562.2: 1999 Design and Installation of Sheet Roof and Wall Cladding: Corrugated Fibre-Reinforced Cement
AS/NZS 1562.3: 2006 Design and Installation of Sheet Roof and Wall Cladding – Plastic
AS/NZS 1576.1: 2010 Scaffolding - General Requirements, and Part .4 Suspended Scaffolding
AS/NZS 1580.455.1:1977 Methods of Test for Paints and Related Materials-Resistance to Water at Room Temperature
AS/NZS 1604: 2002 Part 3 Specification for Preservative Treatment of Plywood
AS/NZS 1646: 2007 Elastomeric Seals for Waterworks Purposes
AS/NZS 1664: 1997 Part 1 Aluminium Structures
AS/NZS 1664.1: 1997 Aluminium Structures
AS/NZS 1668 Part 1: 1998 Fire and Smoke Control In Multi-Compartment Buildings
AS/NZS 1668.1: 2015 The Use of Ventilation and Air conditioning in Buildings: Fire and Smoke Control Australian Building Codes Board - International Fire Engineering Guidelines: 2005
AS/NZS 1670.1: 2004 Fire Detection, Warning, Control and Intercom Systems
AS/NZS 1677.1 and .2: 1998 Refrigerating Systems
AS/NZS 1680: 2009 Interior and Workplace Lighting
AS/NZS 1720.4: 2006 Timber Structures
AS/NZS 1730: 1996 Washbasins
AS/NZS 1734: 1997 Aluminium and Aluminium Alloys - Flat sheet, Coiled Sheet and Plate
AS/NZS 1735.1: 2003 /Amdt 1-2006 Lifts, Escalators and Moving Walks – General Requirements
AS/NZS 1735.18: 2002 Passenger Lifts for Private Residence – Automatically Controlled
AS/NZS 1748: 1997 Timber - Street Graded - Product Requirements for Mechanically Stress-Graded Timber
AS/NZS 1768: 2007 Lightning Protection
AS/NZS 1859: 2002 Reconstituted Wood-Based Panels - Part 1 Particleboard
AS/NZS 1865: 1997 Aluminium and Aluminium Alloys - Drawn Wire, Rod, Bar and Strip
AS/NZS 1866: 1997 Aluminium and Aluminium Alloys - Extruded Rod, Bar and Hollow Shapes
AS/NZS 1867: 1997 Aluminium and Aluminium Alloys - Drawn Tubes
AS/NZS 1905.1: 1997 Components for the Protection of Openings in Fire-Resistant Walls

AS/NZS 2023: 1995 Baths for Ablutionary Purposes
AS/NZS 2032: 2006 Installation of PVC Pipe Systems
AS/NZS 2033: 2008 Installation of Polyethylene Pipe Systems
AS/NZS 2041: 1998 Buried Corrugated Metal Structures

AS/NZS 2097: 2006 Methods for Sampling Veneer Plywood
AS/NZS 2098: 2006 Methods of Test for Veneer and Plywood Series
AS/NZS 2111: 1996 Textile Floor Coverings - Tests and Measurements Series
AS/NZS 2119: 1997 Textiles for Floor Coverings-Machine-made-Sampling/Cutting Specimens for Physical Tests
AS/NZS 2179.1:1994 Specifications for Rainwater Goods, Accessories and Fasteners
AS/NZS 2269: 2004 and 2008 Plywood - Structural
AS/NZS 2271: 2004 Plywood and Blockboard for Exterior Use
AS/NZS 2280: 2012 Ductile Iron Pipes and Fittings
AS/NZS 2293: 1995 Emergency Evacuation Lighting for Buildings
AS/NZS 2312: 2012 Guide to the Protection of Structural Steel Against Atmospheric Corrosion by the Use of Protective Coatings
AS/NZS 2327.1: 1980 Composite Construction in Structural Steel And Concrete (Known As The SAA Composite Construction Code) - Simply Supported Beams
AS/NZS 2350: 2006 Methods of Testing Portland and Blended Cements Series
AS/NZS 2381: 2008 Electrical Equipment for Explosive Atmospheres - Selection, Installation and Maintenance
AS/NZS 2460: 2002 Acoustics - Measurement of the Reverberation Time of Rooms
AS/NZS 2499: 2000 Acoustics - Measurements of Sound Insulation in Buildings and of Building Elements
AS/NZS 2535.1: 2007 Test Methods for Solar Collectors - Thermal Performance of Glazed Liquid heating Collectors Including Pressure Drop
AS/NZS 2566: 2002 Buried Flexible Pipelines
AS/NZS 2588: 1998 Gypsum Plasterboard
AS/NZS 2589: 2007 Gypsum Lining - Application and Finishing
AS/NZS 2642: 1994 Polybutylene Pipe Systems
Part 1: 2007 Polybutylene (PB) Pipe Extrusion Compounds
Part 2: 2008 Polybutylene (PB) Pipe for Hot and Cold Water Applications
Part 3: 2008 Mechanical Jointing Fittings for Use with Polybutylene (PB) Pipes for Hot and Cold Water
AS/NZS 2699: 2000 Built-in Components for Masonry Construction
AS/NZS 2712: 2007 Solar and Heat Pump Water Heaters - Design and Construction
AS/NZS 2728: 2007 and 2013: Prefinished / Prepainted Sheet Metal Products for Interior / Exterior Building Applications
AS/NZS 2845: 2010 Water Supply - Backflow Prevention Devices
AS/NZS 2890: 2009 Parking Facilities
Part 6: Off-Street Parking for People with Disabilities
AS/NZS 2904: 1995 Damp-Proof Courses and Flashings
AS/NZS 2908: 2000 Cellulose Cement Products - Part 1: Corrugated Sheets, and Part 2: Flat Sheets
AS/NZS 2914: 2007 Textile Floor Coverings - Informative Labelling
AS/NZS 2918: 2001 Domestic Solid Fuel Burning Appliances - Installation

AS/NZS 3000: 2007 Electrical Installations - Buildings, Structures and Premises (known as SAA Wiring Rules)
AS/NZS 3001: 2008 Electrical Installations - Transportable Structures and Vehicles Including Their Site Supplies
AS/NZS 3002: 2008 Electrical Installations - Shows and Carnivals
AS/NZS 3003: 2011 Electrical Installations - Patient Areas
AS/NZS 3004.1 and 2: 2008 Electrical Installations - Marinas and Recreational Boats
AS/NZS 3008.1.1: 2009 Electrical Installations - Selection of Cables
AS/NZS 3012: 2010 Electrical Installations - Construction and Demolition Sites
AS/NZS 3013: 2005 Electrical Systems: Classification of Fire and Mechanical Performance of Wiring Systems
Australian Building Codes Board - International Fire Engineering Guidelines: 2005
AS /NZS 3013: 2005 Electrical Installations - Classification of Fire and Mechanical Performance of Wiring System Elements
AS/NZS 3014: 2003 Electrical Installations - Electric Fences
AS/NZS 3017: 2007 Electrical Installations - Verification Guidelines
AS/NZS 3019: 2007 Electrical Installations - Periodic Verification
AS/NZS 3100: 2009 Approval and Test Specification: General Requirements for Electrical Equipment
AS/NZS 3112: 2011 Approval and Test Specification: Plugs and Socket Outlets
AS/NZS 3136: 2001 Approval and Test Specification – Electrical Equipment for Spa and Swimming Pools
AS/NZS 3191: 2009 Electrical Flexible Cords
AS/NZS 3350.2.35: 1999 Safety of Household and Similar Electrical Appliances
AS/NZS 3500: 2013 National Plumbing and Drainage Code Part 1: 2003 Water Services
Part 1: 2003 Water Services
Part 2: 2003 Sanitary Plumbing and Drainage
Part 4: 2003 Heater Water Services

Part 5: 2012 Housing Installations
AS/NZS 3500.1: 2015 Plumbing and Drainage - Part 1 Water Services
AS/NZS 3500.3: 2015 Stormwater Drainage and 3500.5 Household Installations
AS/NZS 3518: 2004 Acrylonitrile Butadiene Styrene (ABS) Compounds Pipes and Fittings for Pressure Applications
AS/NZS 3580.9.6: 2015 Methods for Sampling and Analysis of Ambient Air -Method 9.6
AS/NZS 3598: 2000 Energy Audits
AS/NZS 3600: 2009 Concrete Structures
AS/NZS 3661: 1993 Slip Resistance of Pedestrian Surfaces
AS/NZS 3666: 2011 Air-Handling and Water Systems - Microbial Control, Design, Installation and Commissioning
AS/NZS 3666.1: 2011 Air-Handling and Water Systems of Buildings
AS/NZS 3678: 1996 Structural Steel - Hot-Rolled Plates, Floorplates and Slabs
AS/NZS 3679.1: 2010 Structural Steel - Hot-Rolled Bars and Sections
AS/NZS 3700: 2011 Masonry Structures
AS/NZS 3725: 2007 Design for Installation of Buried Concrete Pipes
AS/NZS 3733: 1995 Textile Floor Coverings - Cleaning Maintenance of Residential and Commercial Carpeting
AS/NZS 3760: 2010 In-Service Safety Inspection and Testing of Electrical Equipment
AS/NZS 3823: 2013 Performance of Electrical Appliances - Air Conditioners and Heat Pumps
AS/NZS 3823.1.2: 2012 Performance of Electrical Appliances for Testing Package Air Conditioning Equipment
AS/NZS 3837: 1998 Method of Test for Heat and Smoke Release Rates for Materials Using an Oxygen Consumption Calorimeter
AS/NZS 3845: 1999 Road Safety Barrier System and the Australian Bridge Design Code (SAA HB77) Australian Bridge Design Code (SAAHB77)
AS/NZS 3869: 1999 Domestic Solid Fuel Burning Appliances - Design and Construction
AS/NZS 3896: 1998 Waters – Examination for Legionellae Including Legionellae pneumophila

AS/NZS 4020: 2005 Testing of Products for Use in Contact with Drinking Water
AS/NZS 4058: 2007 Pre Cast Concrete Pipes (pressure and non-pressure)
AS/NZS 4063: 1992 Characterisation of Structural Timber Series
AS/NZS 4100: 1998 Steel Structures
AS/NZS 4129: 2008 Fillings for Polyethylene (PE) Pipes for Pressure Applications
AS/NZS 4130: 2009 Polyethylene (PE) Pipe for Pressure Applications
AS/NZS 4200: 1994 Pliable Building Membranes and Underlays, Part 1: 1994 Materials
AS/NZS 4232: 1994 Performance Criteria for Fire Resisting Enclosures, Part 2: 1988 Fire Resisting Glazing Systems
AS/NZS 4234: 2008 Heated Water systems - Calculation of Energy Consumption
AS/NZS 4256: 1994 Plastic Roof and Wall Cladding Materials
AS/NZS 4331: 1995 Metallic Flanges Part 1: Steel Flanges
AS/NZS 4347: 1995 Damp-Proof Courses and Flashings - Method of Test Series
AS/NZS 4401: 2006 High Density Polyethylene (PE-HD) Pipes and Fittings for Soil and Waste Discharge (low and high temperature) Systems Inside Buildings
AS/NZS 4455: 1997 Masonry Units and Segmental Pavers
AS/NZS 4456.10: 2003 Masonry Units and Segmental Pavers and Flags - Methods of Test
AS/NZS 4505: 2012 Garage Doors and Other Large Access Doors
AS/NZS 4509: 2009 Battery Enclosure Design
AS/NZS 4509.2: 2010 Stand-Alone Power Systems
AS/NZS 4520: 2010 Fire Resistant Doorsets
AS/NZS 4552.2: 2010 Gas Fired Water Heaters for Hot Water Supply and/or Central Heating
AS/NZS 4576: 1995 1995 Guidelines for Scaffolding
AS/NZS 4586: 2004 Slip Resistance Classification of New Pedestrian Surface Materials - Pool Surround
AS/NZS 4600: 2005 Cold-Formed Steel Structures
AS/NZS 4667: 2000 Insulating Glass Units
AS/NZS 4671: 2001 Steel Reinforcing Materials
AS/NZS 4680: 2006 Hot-Dip Galvanised (zinc) Coating on Fabricated Ferrous Articles
AS/NZS 4692: 2002 Electric Water Heaters
AS/NZS 4692.1:2005 Electric Water Heaters - Energy Consumption, Performance and General Requirements
AS/NZS 4740: 2000 Natural Ventilators - Classification and Performance
AS/NZS 4755.3.5:2016 Demand Response Enabling Devices and Electrical Products – Operational Instructions and Connections for Air Conditioners
AS/NZS 4765: 2007 Modified Polyvinyl Chloride (PVC-M) Pipes for Pressure Applications
AS/NZS 4766: 2006 Polyethylene Storage Tanks for Water and Chemicals
AS/NZS 4776: 2009 Liquid-Chilling Packages Using the Vapour Compression Cycle 2009
AS/NZS 4782: 2006 Double-Capped Fluorescent Lamps Series

AS/NZS 4783: 2001 Performance of Electrical Lighting Equipment
AS/NZS 4792: 2006 Hot-Dip Galvanized (zinc) Coatings on Ferrous Hollow Sections
AS/NZS 4847: 2010 Selfballasted Lamps for General Lighting Services Series
AS/NZS 4858: 2004 Wet Area Membranes
AS/NZS 4859: 2002 Materials for the Thermal Insulation of Buildings
AS/NZS 4879: 2010 Performance of Transformers and Electronic Step-Down Convertors for ELV Lamps Series
AS/NZS 4934 .1: 2014 Incandescent Lamps for General Lighting Service - Part 1: Test Methods - Energy Performance
AS/NZS 4936: 2002 Air Admittance Valves for Use in Sanitary Plumbing and Drainage System
AS/NZS 4965.1:2008, Performance of Close Control Air Conditioners – Testing for Rating
AS/NZS 4994.1: 2009 Temporary Edge Protections - General Requirements

AS/NZS 5000.2: 2005 Electrical Cables Polymeric Insulated For Working Voltages up to and Including 0.6/1 (1.2) kV
AS/NZS 5000.2 2006 Electrical Cables - Polymeric Insulated Part 2 - For Working Voltages up to and Including 450/750
AS/NZS 5026: 2012 The Storage and Handling of Class 4 Dangerous Goods
AS/NZS 5033: 2014 Installation and Safety Requirements for Photovoltaic (PV) Arrays
AS/NZS 5065: 2005 Polyethylene and Polypropylene Pipe and Fittings for Drainage and Sewerage Applications
AS/NZS 5125.1:2010, Heat Pump Water Heaters – Performance Assessment – Air Source Heat Pump Water Heaters
AS/NZS 5149: 2016 Refrigerating Systems and Heat Pumps-Safety & Environmental Requirements, Parts 1-4
AS/NZS 5601: 2013 Gas Installations and Part 1: 2010 General Installations Amend: 1
AS/NZS 5601.1: 2013 General Gas Installations

AS/NZS 60227.5:2003, Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750 V - Flexible Cables
AS/NZS 60335: 2011 Household and Similar Electrical Appliances
AS/NZS 60335.2.6:2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Stationary Cooking Ranges, Hobs, Ovens and Similar Appliances
AS/NZS 60335.2.24:2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers
AS/NZS 60335.2.31: 2010 Household and Similar Electrical Appliances Safety - Particular Requirements for Range Hoods
AS/NZS 60335.2.60 2006 Household and Similar Electrical Appliances – Safety – Particular Requirement for Whirlpool Baths
AS/NZS 60432.1 and .2: 2007 Incandescent Lamps - Safety Specifications
AS/NZS 60598.1: 2013 Luminaires: General Requirements
AS/NZS 60598.2.18: 1998 Luminaries – Particular Requirements – Luminaries for Swimming Pools and Similar Applications
AS/NZS 60598.2.20: 2002 Luminaires - Particular Requirements - Lighting Chains
AS/NZS 60598: 2001 Luminaires - Part 2.2: Particular Requirements - Recessed Luminaires (IEC 60598-2-2:1996, MOD)
AS/NZS 60598.1: 2003 Luminaries – General Requirements and Tests.
AS/NZS 60598.2.5: 2002 Luminaries – Particular Requirements – Floodlights (IEC 60598.2.5:1998, MOD)
AS/NZS 61231: 2001 International Lamp Coding System (ILCOS)
AS/NZS 61347.1: 2002 Lamp Control-RGear - General and Safety Requirements
AS/NZS 61558.2.6: 2009, Safety of Power Transformers, Power Supplies, Reactors and Similar Products for Supply voltages up to 1 100 V - Particular Requirements for Safety Isolating Transformers and Power Supply Units

AS/NZS IEC 62560: 2014 Self-Ballasted LED-Lamps for General Lighting Services by Voltage Greater Than 50V
AS/NZS ISO 817:2015 Refrigerants – Designation and Safety Classification
AS/NZS ISO 14001:2004, Environmental Management Systems – Requirements with Guidance For Use
AS/NZS ISO 14031: 2000, Environmental Management – Environmental Performance Evaluation – Guidelines

New Zealand Building Code Standards

NZS 1170.5: 2004 Structural Design Actions, Part 5: Earthquakes

NZS 2295: 2006 Pliable, Permeable Building Underlays
NZS 2402P: 1987 Code of Practice for Geothermal Heating Equipment

NZS 2403: 1991 Code of Practice for Deep Geothermal Wells

NZS 3101: 1995 Concrete Structures Standard
NZS 3106: 2009 Design of Concrete Structure for the Storage of Liquids
NZS 3109: 1997 abd 2007 Specification for Concrete Construction
NZS 3112: 2011 Methods of Test for Concrete
NZS 3114: 1987 Specification for Concrete Surface Finishes
NZS 3116: 2002 Concrete Segmental and Flagstone Paving
NZS 3404: 1997 Steel Structures Standard
NZS 3501: 1976 Specification for Copper Tubes for Water, Gas, and Sanitation
NZS 3602: 2003 Part 1 Timber and Wood-Based Products for Use in Buildings
NZS 3603: 1993 Timber Structures Standard
NZS 3604: 1990, 1999 and 2011 Timber Framed Buildings
NZS 3605: 2001 Timber Piles and Poles for Use in Building
NZS 3617: 1979 Specification for Profiles of Weatherboards, Fascia Boards, and Flooring
NZS 3622: 2004 Verification of Timber Properties
NZS 3631: 1988 New Zealand Timber Grading Rules
NZS 3640: 2003 Chemical Preservation of Round and Sawn Timber

NZS 4203: 1992 Code of Practice for General Structural Design and Design Loadings for Buildings
NZS 4206: 1992 Concrete Interlocking Roofing Tiles
NZS 4210: 2001 Code of Practice for Masonry Construction: Materials and Workmanship
NZS 4211: 2008 Specification for Performance of Windows
NZS 4214: 2006 Methods Of Determining the Total Thermal Resistance of Parts Of Buildings
NZS 4217: 1980 Pressured Metal Tile Roofs
NZS 4218: 2004 Energy Efficiency – Housing And Small Building Envelope
NZS 4219: 2009 Specification for Seismic Resistance of Engineering Systems in Buildings
NZS 4223: 2016 Code of Practice for Glazing in Buildings Part 1: 2008 Glass Selection and Glazing
NZS 4229: 2013 Concrete and Masonry Buildings not Requiring Specific Engineering Design, Appendix C
NZS 4230:1990 Code of Practice for the Design of Masonry Structures
NZS 4230: 2004 Design of Reinforced Concrete Masonry Structures
NZS 4231: 1985 Specification for Self-Luminous Exit Signs
NZS 4236: 2002 Masonry Veneer Wall Cladding
NZS 4239: 1993 Automatic Sliding Door Assemblies
NZS 4243: 1996 Energy Efficiency – Large Buildings - Part 1: 2007 Building Thermal Envelope, and Part 2: 2007 Lighting
NZS 4243.2: 2007 Energy Efficiency - Large Buildings - Lighting
NZS 4246: 2006 Energy Efficiency – Installing Insulation In Residential Buildings
NZS 4251: 2007 Solid Plastering - Cement Plaster for Walls Ceilings and Soffits
NZS 4256: 1994 Plastic Roof and Wall Cladding Materials
NZS 4303: 1990 Ventilation for Acceptable Indoor Air Quality
NZS 4305: 1996 Energy Efficiency – Domestic
NZS 4332: 1997 Non-Domestic Passenger and Goods Lifts
NZS 4334: 2012 Lifts for Low-rise, Low-speed and Low Use Applications
NZS 4402: 1988 Methods of Testing Soils for Civil Engineering - Part 2 Soil Classification Tests, and Part 4: Soil Compaction Tests
NZS 4431: 1989 Code of Practice for Earth Fill for Residential Development
NZS 4442: 1988 Welded Steel Pipes And Fittings For Water, Sewage And Medium Pressure Gas
NZS 4514: 2009 Inter-Connected Smoke Alarms For Houses
NZS 4515: 2009 Fire Sprinkler Systems For Life Safety In Sleeping Occupancy (Up To 2,000 M2)
NZS 4520: 2010 Fire-Resistant Doorsets
NZS 4602: 1988 Low Pressure Copper Thermal Storage Electric Water Heaters
NZS 4603: 1985 Installation of Low Pressure Thermal Storage Electric Water Heaters with Copper Cylinders (Open Vented Systems)
NZS 4606: Storage Water Heaters
NZS 4607: 1989 Installation of Thermal Storage Electric Water Heaters: Valve Vented Systems
NZS 4608: 1992 Control Valves for Hot Water Systems
NZS 4613: 1986 Domestic Solar Water Heaters
NZS 4614: 1986 Installation of Domestic Solar Water Heating Systems
NZS 4617: 1989 Tempering (3-port mixing) Valves

NZS 5262: 2003 Gas Appliance Safety Amend: 1

NZS 6214: 1988 Thermostats and Thermal Cutouts for Domestic Thermal Storage Electric Water Heaters (Alternating Current Only)
NZS 4603: 1985 Installation Of Low Pressure Thermal Storage Electric Water Heaters With Copper Cylinders Gas Space Heaters: Performance Testing and Energy Labelling, Commonwealth of Australia, May, 2015
NZS 6703: 1984 Code of Practice for Interior Lighting Design

NZS 7601: 1978 Specification for Polyethylene Pipe (Type 3) for Cold Water Services
NZS 7602: 1977 Specification for Polyethylene Pipe (Type 5) for Cold Water Services
NZS 7610: 1991 Ble Polyethylene Pipes up to Nominal Size 63 for Below Ground Use for Potable Water

Acceptable Solutions in the New Zealand Building Code

B1/ASE Acceptable Solution in New Zealand Building Code: Small Chimneys
E2/AS1 Amendment 6 or Later - Weathertightness of the Building Envelope New Zealand Metal Roof and Wall Cladding Code of Practice - Guidance on Flashing Materials
G12/AS1 Water Supplies

Verification Methods In The New Zealand Building Code

Verification Method CV1 Building Setback Based on Heat Flux
Verification Method CV1 Building Setback Based on Heat Flux
Verification Method E2/VM1 Cladding Systems of Buildings Including Junctions with Windows, Doors and Other Penetrations - applicable to timber frame construction up to 3 Storeys in Height for only the following:

a) masonry veneer, paragraph 9.2
b) stucco, paragraph 9.3
c) timber weatherboards, paragraph 9.4
d) fibre cement weatherboards, paragraph 9.5
e) profiled metal wall claddings, paragraph 9.6
f) fibre cement sheet, paragraph 9.7
g) plywood sheet, paragraph 9.8
h) EIFS, paragraph 9.9

Verification Method E2/VM1 Cladding Systems of Buildings Including Junctions with Windows, Doors and Other Penetrations - applicable to timber frame construction up to 3 STOREYS in height

New Zealand Building Code and British Standards

NZS/BS 3601:1987 Specification for Carbon Steel Pipes and Tubes with Specified Room Temperature Properties for Pressure Purposes
NZS/BS 970: 1991 Specification for Wrought Steels a for Mechanical and Allied Engineering Purposes

Part 0: 2002 General Principles Amends 1,2,3,4,5
Part 1: 2002 Permanent, Imposed and Other Actions
Part 2: 2002 Wind Actions Amends: 1,2,3

International Building Code

IBCO Evaluation Services Inc AC148: Acceptance Criteria for Flashing Materials

British Standards

BS 10: 2009 Specification for Flanges and Bolting for Pipes, Valves and Fittings
BS 1256: 2000 Threaded Pipe Fittings in Malleable Cast Iron and Cast Copper Alloy
BS 2971: 1991 Specification for Class II Arc Welding of Carbon Steel Pipework for Carrying Fluids
BS 3799: 1974 Specification for Steel Pipe Fittings, Screwed and Socket-Welding for the Petroleum Industry
BS 437: 2008 Specification for Cast Iron Spigot and Socket Drain Pipes and Fittings
BS 4991: 1974 (1982) Specification for Propylene Copolymer Pressure Pipe
BS 5385: 2009 Wall and Floor Tiling Code of Practice
BS 5385.1: 2009 Wall and Floor Tiling- Design and Installation
BS 5395: 1984 Stairs, Ladders and Walkways - Code of Practice for the Design of Helical and Spiral Stairs
BS 585: 1989 Specification for Stairs with Closed Risers For Domestic Use, Including Straight and Winder Flights and Quarter or Half Landings, Wood Stairs: Part 1

BS 6037: 1990 Code of Practice for the Planning, Design, Installation and Use of Permanently Installed Access Equipment
BS 6349: Part 4: 1994 Gives Guidance on Types of Fenders, Fendering Systems and Layouts, Mooring Devices and Ropes, Mooring System Layouts
BS 6464: 1984 Specification for Reinforced Plastics Pipes, Fittings and Joints for Process Plants
BS 6920: 2000 Suitability of Non-metallic Products for Use in Contact with Water Intended for Human Consumption with Regard to their Effect on the Quality of the Water
Part 1: 2000 Specification G12/AS1
Part 2: 2000 Methods of Tests G12/AS1
Part 3: 2000 High Temperature Tests
BS 7159: 1989 Code of Practice for Design and Construction of Glass-reinforced Plastics (GRP) Piping Systems for Individual Plants or Sites
BS 7190: 1989 Assessing Thermal Performance of Low Temperature Hot Water Boiler Using a Test Rig
BS 7273: 2007 Part 4 Actuation of Release Mechanisms for Doors
BS 7777: 1993 Flat Bottomed, Vertical, Cylindrical Storage Tanks for Low Temperature Service
BS 8000.11.1: 1990 Workmanship on Building Sites - Code of Practice for Wall and Floor Tiling - Natural Stone Tiles
BS 8004: 1986 Code of Practice for Foundations
BS 8102: 2009 Code of Practice for Protection of Below Ground Structure Against Water from the Ground
BS 8298: 1994 Code of Practice for Design and Installation of Natural Stone Cladding and Lining

British / European Standards

BS EN 988: 1977 Zinc and Zinc Alloys - Specification for Rolled Flat Products for Building
BS EN 1172: 1997 Copper and Copper Alloys - Sheet and Strip for Building
BS EN 1490: 2000 Building Valves - Combined Temperature and Pressure Relief Valves, Tests and Requirements
BS EN 1491: 2000 Building Valves - Expansion Valves, Tests and Requirements
BS EN 1567: 1999 Building Valves - Water Pressure Reducing Valves and Combination Water Reducing Valves
BS EN 1759: 2004 Flanges and Their Joints
BS EN 10241: 2000 Steel Threaded Pipe Fittings
BS EN 10253.2: 2007 Butt-Welding Pipe Fittings – Non-Alloy and Ferric Alloy Steels with Specific Inspection Requirements
BS EN 10253.3: 2008 Butt-Welding Pipe Fittings – Wrought Austenitic and Austenitic-ferritic (Duplex) Stainless Steels Without Specific Inspection Requirements
BS EN 12056.2: 2000 Gravity Drainage Systems Inside Buildings. Sanitary Pipework, Layout and Calculation
BS EN 12101: 2005 Smoke and Heat Control Systems
Part 1: 2005 Specification for Smoke Barriers
BS EN 12285: 2003 Workshop Fabricated Steel Tanks
BS EN 12585: 1999 Glass Plant, Pipeline and Fittings – Pipeline and Fittings DN 15 to 1000 – Compatibility and Interchangeability
BS EN 13121.3: 2008 GRP Tanks and Vessels for Use Above Ground, Design and Workmanship Above Ground Fuel Storage on Farms Good Practice Guide, published by Work Safe New Zealand
BS EN 13363.1: 2003 + A1: 2007 Solar Protection Devices Combined with Glazing - Calculation of Solar and Light Transmittance Simplified Method
BS EN 14604: 2005 Smoke Alarm Devices
BS EN 15243: 2007 Ventilation for Buildings - Calculation of Room Temperatures and of Load and Energy For Buildings with Room Conditioning Systems
BS EN 62384: 2006 DC or AC Supplied Electronic Control Gear for LED Modules - Performance Requirements
BS EN ISO 3382-3: 2012 Acoustics - Measurement of Room Acoustic Parameters
BS EN81: 1998 Safety Rules for the Construction and Installation of Lifts
BSDD 175: 1988 Code of Practice for the Identification of Potentially Contaminated Land and its Investigation

European Standards

EN 10088.1: 2005 Stainless Steels
EN 115: 2008 Safety of Escalators and Moving Walks
EN 12057: 2004 Natural Stone Stiles - Modular Tiles - Requirements
EN 12058: 2004 Natural Stone Products - Slabs for Floors and Stairs - Requirements
EN 1469: 2004 Natural Stone Products - Slabs for Cladding - Requirements
EN 15643.1: 2010 Sustainability of Construction Works - Sustainability Assessment of Buildings - Part 1
EN 15900: 2010, Energy Efficiency Services – Definitions and Requirements
EN 15942: 2011, Sustainability of Construction Works – Environmental Product Declarations – Communication Format Business-to-Business.
EN 19059: 2004 Natural Stone Products - Dimensional Stone Work - Requirements

EN 50521: 2008 Connectors for Photovoltaic Systems - Safety Requirements and Tests
EN 81: 1998 Safety Rules for the Construction and Installation of Lifts

International Organisation for Standardisation

ISO 354: 2003 Acoustics & Mdash - Measurement of Sound Absorption in a Reverberation Room
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Index B -
Building Functions

Glazing Requirements for Human Impact Safety

Scope

The following provides minimum standards for glazing in locations subject to human impact to reduce the potential for harm and injury to humans and property. Standards for the fabrication of glazing for durability, fire resistance, visibility and fall protection are provided.

All standards are based on NZS 4223 Glazing in Buildings: Human Impact Safety Requirements. This document should be referenced when interpreting the provisions in the NBC and in this Appendix.

NZS 4223: 2016 replaces nine sections of the previous standard (AS 1266), with the most relevant sections being as follows. These sections should be referred to for clarification:

Part 1 (2016) - glass selection, glazing, materials, general design criteria, glazing and glass assemblies

Part 2 (2016) - quality assurance, insulating glass units, minimum standards

Part 3 (2016) - human impact safety

Part 4 (2016) - minimum glass thickness for vertical and sloped overhead glazing to resist limit state actions

Provisions and standards in this Appendix apply to all glazing subject to the NBC, except for the following:

(a) glazing in lift cars and liftwells

(b) furniture and cabinet glass, vanities, glass basins, refrigeration units, internal glass fitments, glass wall linings, framed internal wall mirrors, and mirrors not specifically indicated in this Appendix

(c) glazing in buildings and structures with no public access intended, or for non-habitable building and structures intended for horticultural or agricultural use

(d) restoration or repairs to existing decorated glass

(e) glazing that might fall due to stress other than tensile stresses, such as glass floors

(f) plastic glazing materials

(g) construction and installation of windows (refer to NZS 3504, NZS 3619, and NZS 4232.2)

(h) glass blocks, pavers, slumped, formed or cast glass

(i) point-fixed or point-supported systems, used for glazing, cladding, signage and the like, not specifically covered in this Appendix or in NZS 4223.2

Provisions for Glazing as Barriers (glass walls, balustrades, screens, and the like) that provide fall protection (safeguard a difference in height of over 1,000 mm) can be found in NZS 4223.3, Tables 9 through 17 of this Appendix, and supporting text in the NBC.

Where wording and tables from NZS 4223 are used, they are dually noted. The entirety of NZS 4223 is applicable to the provisions in this Appendix.

Definitions

The following definitions, as worded in NZS 4223, are applicable to this Appendix, in addition to the definitions in the NBC.

Annealed Glass

Glass that is cooled gradually during manufacture or in an annealing operation to reduce residual stress and strains that can be produced during cooling - includes sheet, plate, rolled and float glass. ANNEALED GLASS IS NOT SAFETY GLASS.

Decorative Glass

Clear or patterned glass processed by craftsman for decorative effect, including stained glass, leadlight, sandblasted, acid etched, embossed and printed glass

Frame

A structure manufactured from timber, metal, glass or other durable material or combinations of materials, such as glass fins and structural sealant, providing continuous structural support to the full length of a glazed pane

Glazing

The installation of glass in prepared openings in windows, door panels, partitions, etc., as well as the glass panes in such installations

Heat-strengthened Glass

Glass that has been strengthened by a special heat treatment, so that the residual stresses lie between those for ordinary annealed glass and toughened glass

Insulating Glass Unit (IGU)

Two or more panes of glass spaced apart and factory hermetically sealed with dry air or special gases in the unit cavity. Often abbreviated to as IGU.

Laminated Glass

Glass used in signage, lighting, display systems, and so on

Manifestation

Marking of GLAZING to make it visible

Pane

Single piece of glass cut to size for GLAZING

Panel

An assembly containing one or more panes

Point Fixed

Glass fixed with clamps or fittings fixed through holes or notches in the glass, also known as point supported

Safety Glass

Glass that has been tested and complies with the relevant requirements of AS/NZS 2208 or BS EN 12150-2 or BS EN 14449 or ANSI Z97.1. All SAFETY GLASS referred to in this Appendix is "Grade A" as specified in AS/NZS 2208.

Heat-soaked Toughened Safety Glass

Toughened glass that satisfies the relevant requirements of a safety GLAZING material standard and complies with BS EN 14179-1

Heat-strengthened Laminated Safety Glass

Laminated SAFETY GLASS utilising two or more panes of heat-strengthened glass in the make-up and satisfying the relevant requirements of a safety GLAZING material standard (for example, AS/NZS 2208)

Laminated Safety Glass
Laminated glass that satisfies the relevant requirements of a safety GLAZING material standard (for example, AS/NZS 2208)

Organic-backed Safety Glass
A GLAZING material consisting of a piece of glass with a sheet of tear-resistant organic material permanently bonded to one side, which satisfies the relevant requirements for a safety GLAZING material standard (for example, AS/NZS 2208)

Organic-backed Safety Mirror (vinyl-backed)
A GLAZING material consisting of a piece of glass mirror with a sheet of tear-resistant organic material permanently bonded to one side, which satisfies the relevant requirements for a safety GLAZING material standard (for example, AS/NZS 2208)

Toughened Safety Glass
Toughened glass that satisfies the relevant requirements of a safety GLAZING material standard (for example, ASNZS 2208)

Wired Safety Glass
Wired glass that satisfies the relevant requirements of a safety GLAZING material standard (for example, AS/NZS 2208)

Transparent Glass
Glass that transmits light and permits clear vision through it

Toughened Glass
Glass that is subjected to special heat or chemical treatment so that the residual surface compression stress and the edge compression stress is greater than heat-strengthened glass (refer to AS/NZS 4223.1 for residual surface compressive stress)

Notes:

1. *Toughened glass is not necessarily toughened SAFETY GLASS*
2. *In general, the heat treatment or chemical treatment process greatly reduces the tendency of glass to fracture under the action of external forces and changes to temperature*
3. *After being toughened, the glass cannot be cut, drilled, ground or otherwise reworked. Etched, sandblasted, engraved or otherwise worked surfaces will need to have such surface working carried out prior to toughening. Surface treatments should be kept as shallow as possible to ensure that the glass can be adequately toughened, and these can reduce the design capacity (refer to AS/NZS 4223.1)*
4. *Toughened glass is also known as tempered glass*

Table A
A summary of design requirements for GLAZING to safeguard humans against potential harm is provided in Table A. This table is a summary of provisions in NZS 4223 (sections 1 through to 20) with some slight modifications.

Tables 1 - 8
These tables are reproductions of Tables 1 through to 8 in NZS 4223, with table numbers here in Appendix C corresponding with table numbers in NZS 4223.

Table A: Safety Requirements for Glazing

Glazing Type	Description	Toughened Glass	Annealed Glass	SAFETY GLASS						Required to be Visible (Manifest-ation)	Permitted Exceptions
				Table 1	Table 2	Table 3	Table 4	Table 5	Table 6		
Door GLAZING	fully framed			•						•	
	fully framed with single pane		5mm min. thickness with a max. area of 0.5m2							•	
	fully framed IGU - both panes		5mm monolith-ic with a max. area of 0.75 m2							•	
	unframed	8mm thick for internal doors, 10mm thick for external doors								•	
	wardrobe / closet door			•							4mm organic-backed safety mirror with max. fully framed area of 2.0 m2
	roller / tilting / sectional			•							
Door - Side Panels	fully framed			•						•	
	fully framed with single pane		5mm min. thickness with a max. area of 0.5m2							•	
	fully framed IGU - both panes		5mm monolith-ic with a max. area of 0.75 m2							•	
	unframed side edges without exposed edges						•	•		•	
	unframed side edges with exposed edges	8mm thick for internal use, 10mm thick for external use					•	•		•	
	other	subject to specific design									

Table A (continued): Safety Requirements for Glazing

GLAZING Type	Description	Toughened Glass	An-nealed Glass	SAFETY GLASS						Required to be Visible (Manifest-ation)	Permitted Exceptions
				Table 1	Table 2	Table 3	Table 4	Table 5	Table 6		
Low Level Glazing - capable of being mistaken for an unimpeded path of travel	fully framed			•						•	
	partly framed						•	•		•	
Low Level Glazing - not capable of being mistaken for an unimpeded path of travel	fully framed			•							Annealed glass (minimum 5mm thickness) complying with Table 2
	partly framed						•	•			
BATHROOM, ensuite and spa (windows, shower doors, bath enclosures, screens)	fully framed			•							
	partly framed (at least 1 unframed, or two opposite unframed edges)	minimum 5 mm thick									
	partly framed (two adjacent or 3 or more unframed edges)	minimum 6 mm thick									
	unframed	minimum 6 mm thick									
Shopfronts	general - (internal or external doors, side panel, or low level GLAZING)						•	•		•	
	fully framed		•								Annealed glass (minimum 5mm thickness) complying with Table 2
	partly framed - 1 or more side edges unframed but not exposed						•	•			
	unframed top edge and any other	subject to specific design									

APPENDIX C

Table A (continued): Safety Requirements for Glazing

GLAZING Type	Description	Toughened Glass	Annealed Glass	SAFETY GLASS						Required to be Visible (Manifest-ation)	Permitted Exceptions
				Table 1	Table 2	Table 3	Table 4	Table 5	Table 6		
Window Seat	GLAZING extends to 800mm from the seat level			•							
Internal Partitions	general						•	•		•	
	fully framed			•							Annealed glass (minimum 5mm thickness) complying with Table 2
	partly framed - 1 or more side edges unframed but not exposed						•				
	unframed top edge and any other	subject to special design									
Stairways and Ramps (within 2,000mm vertical distance from any part)	within 1,000mm horizontal distance of walking surface			•							
	within 2,000mm horizontal distance and at right angle to bottom riser of each stair flight			•							
	protected by a compliant barrier and within 1,000mm horizontal distance from the barrier			•							
Leadlights and Decorative Glass		Individual									
Louvres	must be SAFETY GLASS minimum 5 mm thick								•		

Table 1 - Maximum areas of safety glass

Type of Safety glass	Nominal thickness (mm)	Fully framed glazing	
		Maximum area single glazing (m^2)	Maximum area IGU (m^2)
Toughened	3	1	1.5
	4	2	3.0
	5	3	4.5
	6	4	6.0
	8	6	9.0
	10	8	12[b]
	12	10	15[b]
	15	13[b]	SD
	19	17[b]	SD
Laminated	5	2	3.0
	6	3	4.5
	8	5	7.5
	10	7	10.5[b]
	12	9	13.5[b]
	14	11	SD
	16	13[b]	SD
	18	15[b]	SD
	20	17[b]	SD
Organic-backed safety glass and organic-backed safety mirror	3	0.5	NA
	4	1	NA
	5	2	NA
	6	3	NA
	8	5	NA
	10	7	NA
	12	9	NA
Wired safety glass	6	2	3.0

NOTE -

(1) For an alternative solution see 1.4

(2) NA - Not applicable

(3) SD - Specific design required

a The IGU area is based on the same thickness for both panes, using a factor of 1.5. For non-symmetrical units use the thinner of the two panes to determine the maximum area.

b This area might not be readily available

c Based on glass thickness only - interlayer and film thickness to be added. For wardrobe and closet doors see 4.4. For toughened and heat-strengthened laminated glass, see 2.6 and use nearest greater nominal thickness.

Table 2 - Maximum area of annealed glass

Nominal thickness (mm)	Fully framed maximum area single glazing (m^2)	Fully framed maximum area IGU[a] (m^2)
3	NA	NA
4	1.0	1.5
5	1.5	2.3
6	2.0	3.0
8	3.5	5.3
10	5.0	7.5
12	7.0	10.5[b]
15	10.5	SD
19	15.0	SD
25	21.5[b]	SD

NOTE -

(1) NA = Not applicable

(2) SD = Specific design required.

a The IGU area is based on the same thickness for both panes using a 1.5 factor. For non-symmetrical units use the thinner of the two panes to determine the maximum area.

b This area may not be readily available.

Table 3 - Maximum area of annealed glass - Other GLAZING

Nominal thickness single (mm)	**Fully framed maximum area single** (m^2)	**Nominal thickness IGU** (mm)	**Fully framed maximum area IGU** (m^2)
3	0.50[a]	3 + 3	0.75
4	2.20	4 + 4	3.6
		4 + 5	4.2
5	3.60	5 + 5	5.7
		5 + 6	6.2
6	5.00	6 + 6	7.8
		6 + 8	9.6
8	8.40	8 + 8	SD
		8 + 10	SD
10	12.90	10 + 10	SD
12	17.60	SD	SD

NOTE -

(1) Maximum areas are based on high wind zone (1.36 kPa ULS) from NZS 4223.4.

(2) For pressures above those in note 1, use NZS 4223.4.

(3) Alternatively, annealed glass may be used in conjunction with the strength and deflection requirements of NZS 4223, Part and Part 4.

(4) Where the window GLAZING is safeguarding a fall of 1 m or more design the GLAZING to meet the requirements of section 21.

(5) SD = Specific design required.

a Refer to maximum 3 mm area from NZS 4223.1.

Table 4 - Internal GLAZING including partitions and shopfronts with unframed side edges

Max height of glass (span) (mm)	**Type of glass**	**Unlimited number of vertical sealed joints, glass panes, and pane width Minimum glass thickness** (mm)	**Three-edge support with one vertical sealed joint, maximum pane width of 1200 mm Minimum glass thickness** (mm)
1600	Annealed	8	6
	Toughened	6	6
	Laminated	8	6
2400	Annealed	10	8
	Toughened	10	8
	Laminated	10	8
2600	Annealed	12	10
	Toughened	10	10
	Laminated	12	10
3000	Annealed	12	10
	Toughened	12	10
	Laminated	12	10
3200	Annealed	NA	NA
	Toughened	12	10
	Laminated	16	10
3600	Annealed	NA	NA
	Toughened	15	12
	Laminated	16	12
4000	Annealed	NA	NA
	Toughened	15	12
	Laminated	20	12

NOTE -

(1) Use specific design for heights above 4000 mm.

(2) Adequate edge cover is required to retain the glass under load (Refer to section 4 of NZS 4223.1)

(3) Glass design is based on ULS and SLS internal design wind pressures of 0.50 kPa and 0.36 kPa respectively.

(4) Maximum defection at SLS pressure is restricted to span/60 and 30 mm for three-edge support.

(5) For design loads exceeding those in note 3, Table 5 may be used up to its limits.

(6) Joints between glass panes are to be sealed with silicone.

(7) For toughened laminated glass use the toughened glass limits.

(8) NA = Not applicable.

Table 5 - External GLAZING including shopfronts with unframed side edges

Max height of glass (span) (mm)	Type of glass	Unlimited number of vertical sealed joints, glass panes, and pane width **Minimum thickness** (mm)				Three-edge support with one vertical sealed joint, maximum pane width of 1500 mm **Minimum thickness** (mm)			
		Wind zone (ULS)				Wind zone (ULS)			
		Low	Medium	High	Very High	Low	Medium	High	Very high
		0.72 kPa	0.96 kPa	1.36 kPa	1.76 kPa	0.72 kPa	0.96 kPa	1.36 kPa	1.76 kPa
2000	Annealed	10	12	15	19	8	10	12	15
	Toughened	10	10	12	12	8	8	10	10
	Laminated	10	12	16	16	8	10	12	16
2400	Annealed	12	15	19	NA	10	10	12	15
	Toughened	12	12	15	15	10	10	12	12
	Laminated	12	16	20	20	10	10	12	16
2800	Annealed	15	19	NA	NA	12	12	15	15
	Toughened	12	15	15	19	12	12	15	15
	Laminated	18	20	20	24	12	12	16	16
3000	Annealed	15	19	NA	NA	12	12	15	15
	Toughened	15	15	19	19	12	12	15	15
	Laminated	16	20	24	30	12	12	16	16
3200	Annealed	NA	NA	NA	NA	NA	NA	NA	NA
	Toughened	15	15	19	19	12	15	15	15
	Laminated	16	20	24	30	12	16	16	16
3600	Annealed	NA	NA	NA	NA	NA	NA	NA	NA
	Toughened	19	19	25	25	15	15	19	19
	Laminated	20	24	30	NA	16	16	20	20
4000	Annealed	NA	NA	NA	NA	NA	NA	NA	NA
	Toughened	19	19	25	NA	15	15	19	19
	Laminated	24	24	30	NA	16	16	20	20

NOTE -

(1) Use specific design for heights above 4000 mm.

(2) Adequate edge cover is required to retain the glass under load (refer to section 4 of NZS 4223.1).

(3) Glass design is based on ULS design wind pressures.

(4) Maximum deflection at SLS pressure is restricted to span/60, and 30 mm for three-edge support.

(5) Use specific design for design loads exceeding those in notes 2 and 3.

(6) Joints between glass panes are to be sealed with silicone.

(7) For toughened laminated glass use the toughened glass limits.

(8) NA = Not applicable.

Table 6 - Louvre blades

Type and thickness (mm)	**Maximum blade length** mm		
	Less than 100 wide	100 to 155 wide	155 to 225 wide
Annealed			
4	500	600	NA
5	600	750	750
6	750	900	900
Toughened			
4	600	700	800
5	800	900	1000
6	1000	1100	1200
Laminated			
6	700	800	900

NOTE -

(1) For low and medium wind zones only

(2) For wind zones above medium check the louvres for strength and deflection in accordance with NZS 4223.4.

(3) Louvres safeguarding a fall of 1 m or more may require specific design.

(4) NA = Not applicable

Table 8 - Full height partly framed GLAZING protecting a fall of 1000 mm or more

Occupancy type (AS/NZS 1170.1)	SLS design load (multiply by 1.5 for (ULS)			Maximum glass height (mm)							
				Toughened safety glass				Toughened laminated safety glass			
	Line kN/m	Concentrated kN	Uniform kPa	10	12	15	19	10	12	16	20
A	NA	NA	0.5	2400	2750	3250	3850	2400	2750	3400	4050
A (other) & C3	NA	NA	1.0	1950	2300	2900	3600	1950	2300	3050	3900
B, E	NA	NA	1.0	1950	2300	2900	3600	1950	2300	3050	3900
C1/C2, D, and C5	NA	NA	1.5	1700	2000	2500	3200	1700	2000	2600	3400

NOTE -

(1) The top and bottom edges of the glass panels are supported by continuous frames.
(2) The side edges are unframed and silicone butt jointed, and glass panels are at least 1000 mm wide. Side edges of end panels are framed.
(3) The joints are at least 6 mm wide and sealed with structural silicone.
(4) Do not use this table for glass supported by point fixings (stand-off, spider fittings and so on).
(5) For design, short-term infill LIVE LOADS are applied as follows - 100% of the uniform infill load is applied up to 1200 mm above the bottom edge of the glass, and 50% of uniform infill load applied from 1200 mm to 2000 mm.
(6) Glass deflections are restricted to span/60 to a maximum of 30 mm. The span is the glass height.
(7) Glass thicknesses are nominal and for toughened laminated glass they exclude the interlayer.
(8) Wind pressure on the GLAZING must also be considered as this may be the critical load for design.

1.0 Thermal Performance Submissions and Calculations

Buildings, structures and amenities on site required to demonstrate energy efficient design must use the following methodology to satisfy performance requirements of Section H, or use an ALTERNATIVE SOLUTION.

Requirements for submission vary according to building type and scale as shown in Table H3.A.1. Consult with this table (also shown on page H-17) to determine submission requirements.

Table H3.A.1 Required Evidence for Thermal Performance per Building Group

	Appliances	Plumbing	Heating / Cooling	Windows	Roof	Ceiling / Floor / Walls	Site / Landscape	Lighting	Required Evidence
Building Group 1, 2, 3 (NZS 4243.1 and .2 Energy Efficiency in Large Buildings applies)	•	•	•	•	•	•	•	•	• Description of energy efficient design features • Thermal Modelling
Building Group 4 and 5 (NZS 4218 Energy Efficiency for Small Building Envelope applies)	•			•	•		•	•	• Description of energy efficient design features

1.1 Description of Energy Efficient Design Features

The following evidence (see Table AP-D-2) must be presented and deemed acceptable by the Government of Samoa in order to satisfy applicable Performance Requirements of Section H.

Table AP-D-1 Required Evidence for Thermal Performance

	REQUIRED EVIDENCE
Appliances	• make, model number, and energy efficiency rating
Plumbing	• material for pipe, including energy efficiency rating • material for INSULATION, where provided, and energy efficiency rating
Heating / Cooling	• details of ventilation system, including natural and mechanical components • make, model number, and energy efficiency rating of machinery, ducts • material for INSULATION, where provided, and energy efficiency rating
Windows	• make, model number, and energy efficiency rating of glazing (U-value, R-value) • methods of shading, redirecting solar radiation
Roof	• materials and energy efficiency rating (R-value) of all components, including air spaces,INSULATION
Ceiling / Floor / Walls	• materials and energy efficiency rating (R-value) of all components, including air spaces,INSULATION
Site / Landscape	• provision of shading, redirecting solar radiation, windbreaks • orientation on SITE and adjacent lands related to topography, hydrology, wind patterns, temperature, natural features, other buildings
Lighting	• make, model number and energy efficiency rating

1.2 Required Information

In addition to information required as part of Section 1.1 above, the following information must be provided:

(a) location on SITE related to topography, hydrology, wind patterns, temperature, natural features

(b) BUILDING or FACILITY orientation and adjacent structures

(c) BUILDING form, including:
- (i) the roof geometry, floor plan and number of STOREYS, lifts and escalators
- (ii) the ground to lowest floor arrangements
- (iii) the size and location of windows and GLAZING

(d) energy efficiency strategies used
- (i) external shading, shelter, wind breaks
- (ii) BUILDING MATERIALS

(e) number, type, materials and quality of INSULATION for:
- (i) external doors, floors and ceilings
- (ii) windows and GLAZING
- (iii) EXTERNAL, INTERNAL and separating walls

(f) water heater and air conditioning equipment configuration and zones (including assumptions and means of calculating temperature difference across air conditioning zones)

(g) unit capacity and sequencing for water heaters, refrigeration chillers and cooling towers

(h) wall and floor coverings, furniture and fittings density

(i) internal shading devices, their colour and criteria for operation

(j) energy sources, other than energy generated on-site, that do not emit GREENHOUSE GASES

(k) internal artificial lighting levels

2.0 Thermal Performance Modelling (Building Group 1, 2, and 3)

Thermal performance may be calculated using either of the following two methods:.

1 Approved Thermal Performance Software

2. Manual Method (described below)

2.1 Thermal Performance Software

Thermal Performance Software must:

(a) meet either BESTEST ('Building Energy Simulation Test and Diagnostic Method) or ANSI/ASHRAE Standard 140-2004 performance criteria

(b) have all standards, criteria, and protocol appropriate for a hot, tropical climate

(c) be one of the following approved software products:

- (i) ABCB Protocol for Building Energy Analysis Software
- (ii) software compliant with AS/NZS 3598 Energy Audits
- (iii) BRANZ THERMAL PERFORMANCE software
- (iv) software compliant with ANSI / ASHRAE Standard 140-2004
- (v) other method, check with MWTI beforehand to determine acceptability

(d) must include all aspects listed in Section 1.1 and 1.2 above

2.2 Manual Method to Determine Thermal Performance

Instead of an all-inclusive thermal performance software described in Section 2.1, thermal performance can be calculated for individual building materials using online calculators, charts illustrating energy efficiency ratings for building materials and from best practices techniques acceptable to the Government of Samoa.

The following online calculators are highly effective and are the benchmark from which the Government of Samoa will evaluate the effectiveness of others:

- http://www.thermalcalconline.com
- http://www.cmaa.com.au/r-value - to calculate R-Value for concrete block masonry

Applicants can choose an overall calculator, or calculators for component parts of the building, and assemble together to determine overall thermal performance.

Thermal performance that must be modelled using the manual method includes the following:

(a) **U-value (W/m2K)** - the thermal transmittance of a building element (eg. wall, roof, floor or window). It includes the thermal resistances of all layers (including air cavities) and surfaces resistances at both surfaces of the element. The surface resistances account for both convective and long wave radiation between the element surface and the surroundings. The U value is the heat flow Q (W) through the whole area of the element divided by the total area of the element and temperature difference between external and internal environments. It is, therefore, used in building energy calculations (i.e. SAP, SBEM) to estimate the total heat loss through the building fabric.

(b) **R-value (m2K/W)** is the thermal resistance of a building element and is the reciprocal of the U value (R=1/U).

(c) **psi value or linear thermal transmittance** - the heat transferred through the junctions of the elements and the extra heat which cannot be accounted for by the U- or R-value

The Government of Samoa will determine whether the above energy efficiency ratings are satisfactory.

An example of R-values for different building materials is given in Table AP-D-3 below:

Table AP-D-2 R-Values for Various Building Materials

Material	Thickness (mm)	R-value (m2K/W)
Moving air layer (outside)		-0.04
Still air layer (inside)		0.14
Aluminium	1.2	0
Brick	90	0.05 to 0.07
Concrete	100	0.07
Glass	6	0.006
Sarking Foil	0,2	0.003
Timber	25	0.12 o 0.125
Chipboard	18	0.17
Plasterboard	13	0.077
Mudbrick	300	0,27

To assist in selection of appropriate material to meet energy performance targets, the energy efficiency of different building materials is provided in Table AP-D-4:

Table AP-D-3 Required Evidence for Thermal Performance per Building Group

Material	Reflection	Emittance
Aluminium Paint	.82	0.18
Aluminium - Pure	.97	0.03
Asphalt	.14	0.86
Brickwork - Red Common	.32	0.68
Brickwork - Glazed White	.74	0.26
Concrete	.35	0.65
Fibre Cement (new)	.55	0.45
Fibre Cement (old)	.25	0.75
Galvanised Steel (dull)	.45	0.55
Steel Roof (red/brown)	.25	0.75
Steel Roof (white)	.60	0.40
Glass	.17	0.83
Granite	.45	0.55
Marble - White	.66	0.44
Roofing Felt - Bituminous	.22	0.88
Slate (Dark Grey)	.10	0.90
Tiles (Red)	.40	0.60
Timber (Smooth Planed)	.22	0.78
White Enamel Paint on Steel	.47	0.63
Zinc Oxide oil paint	.70	0.30

TABLE 1. Solar Radiation Absorption Levels Of Various Building Materials
from pg. 4 of the Building Design Guideline for Tropical Climates by Tasman Insulation New Zealand Limited

APPENDIX D

APPENDIX E

Hazardous Substances (Schedule 2 of the Waste Management Act, 2010)

HAZARDOUS WASTES TO BE REGULATED IN ACCORDANCE WITH INTERNATIONAL CONVENTIONS

A. Persistent Organic Pollutants under the Stockholm Convention

Annex A – Parts I and II Elimination	Annex B – Parts I and II Restriction	Annex C – Unintentional Prod'n
Aldrin	DDT – Part I	PCDD/PCDF
Chlordane	DDT – Part II	HCB
Chlordecone		
Dieldrin		
Dioxins		
Endrin		
Furans		
Heptachlor		
Hexachlorobenzine		
Hexabromobiphenyl		
Lindane		
Mirex		
Pentabromodipheny		
Ether		
Toxaphene		
PCB – Parts I and II		

B. Hazardous chemicals under the Rotterdam Convention - Chemicals subject to the Prior Informed Consent Procedure

Chemicals	Relevant CAS number (s)	Category
2,4,5-T	93-76-5	Pesticide
Aldrin	309-00-2	Pesticide
Captafol	2425-06-1	Pesticide
Chlordane	57-74-9	Pesticide
Chlordimeform	6164-98-3	Pesticide
Chlorobenzilate	510-15-6	Pesticide
Chryostile		Pesticide
DDT	50-29-3	Pesticide
Dieldrin	60-57-1	Pesticide
Dinoseb and dinoseb salts	88-85-7	Pesticide
1,2-dibromoethane (EDB)	106-93-4	Pesticide
Endosulfan		Pesticide
Fluoroacetamide	640-19-7	Pesticide
HCH (mixed isomers)	608-73-1	Pesticide
Heptachlor	76-44-8	Pesticide
Hexachlorobenzene	118-74-1	Pesticide
Lindane	58-89-9	Pesticide
Mercy compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds		
Pentachlorophenol	87-86-5	Pesticide
Monocrotophos (Soluble liquid formulations of the substance that exceed 600g active ingredient/1)	6923-22-4	Severely hazardous pesticide formulation
Methamidophos (Soluble liquid formulations of the substance that exceed 600g active ingredient/1)	10265-92-6	Severely hazardous pesticide formulation
Phosphamidon (Soluble liquid formulations of the substance that exceed 1000 g active ingredient/1)	13171-21-6 (mixture, (E)&(Z) isomers) 23783-98-4 ((Z)-isomer) 297-99-4 ((E)-isomer)	Severely hazardous pesticide formulation
Methyl-parathion (emulsifiable concentrates (EC) with 9.5%, 40%, 50%, 60% active ingredient and dusts containing 1.5%, 2% and 3% active ingredient)	298-00-0	Severely hazardous pesticide formulation
Parathion (all formulations – aerosols, dustable powder (DP), emulsifiable concentrate (EC), granules (GR) and wettable powders	56-38-2	Severely hazardous pesticide formulation

(WP) – of this substance are included, except capsule suspensions (CS))		
Crocidolite	12001-28-4	Industrial
Polybrominated biphenyls (PBB)	36355-01-8(hexa-) 27858-07-7 (octa-) 13654-09-6 (deca-)	Industrial
Polychlorinated biphenyls (PCB)	1336-36-3	Industrial
Polychlorinated terphenyls (PCT)	61788-33-8	Industrial
Tris (2,3-dibromopropyl) phosphate	126-72-7	Industrial
Tributyltin		